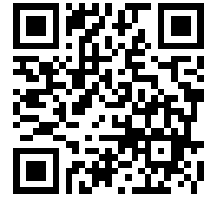

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February, 1968

IDEAL POWER

A MONTHLY MAGAZINE
DEVOTED TO COMPRESSED AIR AND ELECTRICAL APPLIANCES

Vol. 2 APRIL, 1904 No. 1
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CONVENTION DATES.

American Association of General Baggage Agents, meet Cleveland, Ohio, June 14, 1905.

American Association of General Passenger and Ticket Agents, Oct. 12, 1905.

American Association of Railway Surgeons, Chicago, October, 1905.

American Association of Traveling Passenger Agents, Portland, Ore., September, 1905.

American Railway Appliance Exposition, in connection with The International Railway Congress, Washington, D. C., May 3 to 14, 1905.

American Railway Master Mechanics Association, June 14 to 16, 1905.

American Society of Mechanical Engineers, New York, Dec. 5 to 8, 1905.

Association of American Railway Accounting Officers, New York, June 28, 1905

Association of Maintenance of Way Master Painters (U. S. and Canada), Cincinnati, Ohio, Nov. 21 and 22, 1905.

Association of Railway Claim Agents, Boston, May, 1905.

Association of Railway Supt. of Bridges and Buildings, Pittsburg, Pa., Oct. 17 to 19, 1905.

Association of Railway Telegraph Superintendents, Chattanooga, Tenn., May 17, 1905.

Association of Transportation and Car Accounting Officers, Toronto, Canada, June 20, 1905.

Canadian Road Masters' Association, Toronto Jct., Ontario, October, 1905.

Central Association of Railroad Officers, St. Louis Div., St. Louis, Mo., June 21 to 22, 1905.

Eastern Association of Car Service Officers, New York, June 8, 1905.

Eastern Railroad Association, New York, May 10, 1905.

Freight Claim Association, Philadelphia, Pa., May 17, 1905.

International Railway Master Boiler Makers' Association, Buffalo, N. Y., May 16, 1905.

Master Car & Locomotive Painters' Association of the U. S. and Canada, Cleveland, Ohio, Sept. 12 to 15, 1905.

Master Car Builders' Association, Manhattan Beach, Long Island, N. Y., June 19 to 21, 1905.

Master Steam Boiler Makers' Association, Chicago, June 5, 6, 7 and 8, 1905.

National Association of Car Service Managers, Washington, D. C., May, 1905.

National R. R. Master Blacksmiths' Association, Cleveland, Ohio, Aug. 15, 1905.

Railway Storekeepers' Association, Chicago, May 24 and 25, 1905.

Road Masters and Maintenance of Way Association, Niagara Falls, N. Y., September, 1905.

Southern & Southwestern Railway Club, Atlanta, Ga., Nov. 21, 1905.

Train Dispatchers' Association of America, Denver, Colo., June 15, 1905.

Traveling Engineers' Association, September, 1905.

Western Railroad Association, Chicago, January, 1906.

Engineering Societies.

American Society of Mechanical Engineers—Pres., John R. Freeman, Providence, R. I.; Sec., F. R. Hutton, 12 W. 31st St., New York; permanent headquarters, 12 W. 31st St., New York. Next meeting, June, 1905, Scranton, Pa.

Engineers' Club of Philadelphia—Pres., Edgar Marburg; Sec., J. O. Clarke; house, 1122 Girard St.; regular meetings 1st and 3d Saturdays.

American Society of Naval Engineers—Navy Dept., Washington, D. C. Pres., A. F. Dixon, Commander, U. S. N.; Sec. and Treas., Chas. K. Mallory, Lieut., U. S. N.

American Boiler Manufacturers' Association—Pres, R. Monroe, Jr., Pittsburg, Pa.; Sec., J. D. Farasey, Cleveland. Next meeting, Toronto, fall of 1905.

Western Society of Engineers—Pres., H. W. Parkhurst; Sec., J. H. Warder, 1737 Monadnock Block, Chicago, Ill.

Engineers' Society of Western Pennsylvania—Pres., Jas. M. Camp; Sec., Charles Ridinger, Pittsburg. Meetings, third Tuesday of each month.

National Electric Light Association—Pres., Chas. L. Edgar, Boston; Sec., Dudley Ferrand, Newark, N. J.

American Institute of Electrical Engineers—Sec., R. W. Pope, 95 Liberty St., N. Y.

Engine Builders' Association of the United States—Pres., C. A. Gates; Sec., N. B. Payne, Elmira, N. Y. Next meeting, December, 1905, New York.

Universal Craftsmen Council of Engineers—Chief Engineer, John H. Leathers, Rochester, N. Y.; Sec., Chas. E. Davey, Federal Bldg., Detroit, Mich.

National Association of Stationary Engineers—Pres., C. F. Wilson, Milwaukee, Wis.; Sec., F. W. Raven, 140 Dearborn St., Chicago, Ill. Next convention, Louisville. Ky., August, 1905.

American Order of Steam Engineers—Supr. Chief Engr., Hiram M. Trout, Reading, Pa.; Supr. Cor. Engr., Jas. H. Stallings, Baltimore, Md.

Canadian Association of Stationary Engineers—Pres., Chas. Moseley, Toronto; Sec., A. M. Wickens, Toronto.

Ontario Association of Stationary Engineers—Pres., F. W. Donaldson; Registrar, J. G. Bain, 113 Yorkville Ave., Toronto.

IDEAL POWER

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BEAR IN MIND.

That now is the time to subscribe for Ideal Power, as you may desire to procure back numbers when it is too late. There is a time for everything, and now is the time to subscribe for this little publication, which has won a host of friends since its first appearance, and from the number of subscriptions we are receiving daily, we appreciate that all whom this journal visits are going to subscribe, but they are putting it off from day to day on account of possibly more pressing duties. To procrastinate is all right sometimes, but in this case it is liable to cause disappointment if too many calls should be made for the back numbers. The first article of the Evolution of the Locomotive will appear in May number and we feel every one will be anxious to receive the complete series; hence our desire to have as many subscriptions in by that time as possible. Arrangements are being made for a series of several articles by Godfrey L. Carden, Lieutenant United States Revenue Cutter Service, covering his observations abroad during the two years he was gathering foreign exhibits for the Louisiana Purchase Exposition, and these articles will treat on the American Invasion of Europe. Let us have your subscriptions promptly and have your friends join you, that none of the good things to appear in Ideal Power may not be missed.

NOTICE TO SUBSCRIBERS.

Having received a number of inquiries from subscribers with reference to the subscription blank accompanying each copy of Ideal Power, the appearance of same being interperted as a reminder that subscription has not been paid, we have deemed it expedient to avail ourselves of this means of explaining that the blank referred to is sent out with each issue to insure its reaching the hands of those who have not as yet sent in their subscription, as well as to place the same in the hands of subscribers that they may feel sufficiently interested in this little publication as to hand the blank to some friend or acquaintance with a kind word for Ideal Power, and thus be the means of swelling the subscription list. Every subscription is appreciated and aids us just so much in reaching the goal of our ambition—i. e., that Ideal Power may in a short time enjoy the largest circulation of any similar publication in the world and thus enable us to make it more valuable and interesting to all.

THE EVOLUTION OF THE LOCOMOTIVE

With the May issue of Ideal Power, we will begin a series of articles fully illustrated, covering the evolution of the locomotive.

Nothing along the line of mechanics has a greater tendency to awaken the interest of the young than the Locomotive, and we trust that we may be the means of touching a responsive chord of Young America through the articles to follow, covering the improvements made in locomotive building as developed at intervals from its first inception to the present time.

This, perhaps, will be one of the most interesting series of articles ever published, and should be read by every one, old and young, interested in the progress of science.

We solicit your subscription promptly, that you may secure the initial number, as no additional copies will be published. The data we are now arranging to distribute for ten cents, cost thousands of

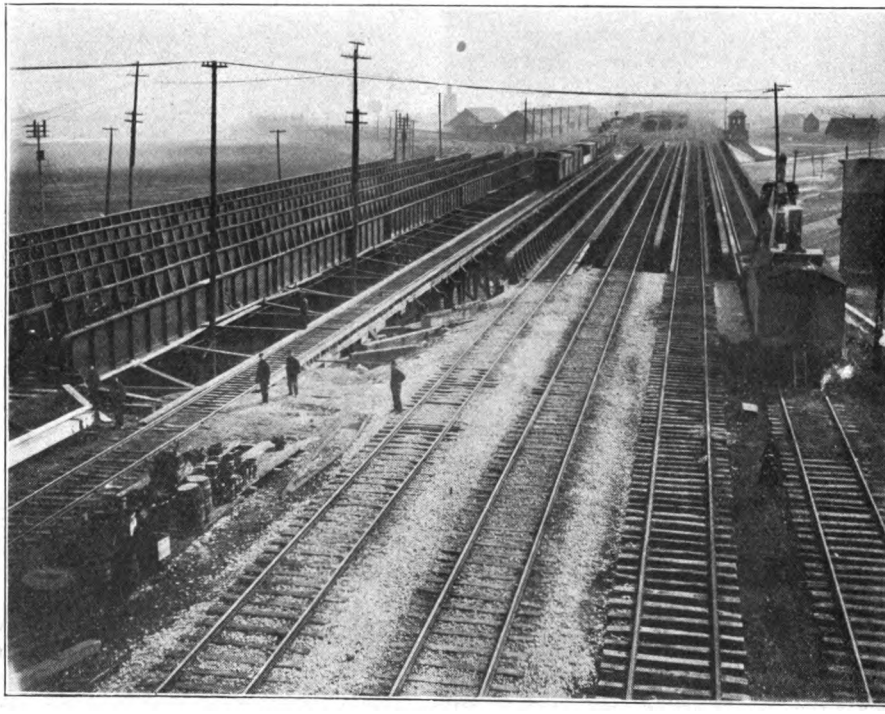
dollars to compile. A subscription from any one will be appreciated. Subscribe for your friends and assist in swelling the circulation of Ideal Power, which will insure renewal of same at the proper time.

ELEVATION OF RAILWAY TRACKS.

Information of Importance to Users of Pneumatic Tools.

Perhaps the most apparent and appreciative improvements within the limits of the city of Chicago within a decade is the result of the city ordinance requiring the elevation of the tracks of the various railways centering therein. The retiring council on the evening of April 6th, as a crowning event to its reign, passed the South Chicago Track Elevation Ordinance. This eliminates sixty-three grade crossings when the provisions of the ordinance have been complied with, and puts the finishing touch to this kind of work in Chicago. The roads affected by this last ordinance are all entering the city from the south and east. The cost of the work is estimated at $4,000,000.

The elevation contemplated is of the Lake Shore and Pennsylvania, beginning at Stony Island avenue and continuing five miles to the Indiana state line. In South Chicago these roads are intersected by a number of others, and they are also elevated to make a complete system. Altogether there are thirty-three subways provided for in the ordinance, more than there are streets now opened, which are crossed, and the ordinance, if accepted by the roads, practically eliminates grade crossings from South Chicago. Considerable mileage has already been elevated at various points within the city limits, the work having been carried on gradually for a number of years, during which time enormous sums of money have been expended by the roads affected.



VIEW OF TRACK ELEVATION P. F. W. & C. RY., CHICAGO.

Attention has recently been drawn to the nine track girder and trough floor construction of the Panhandle division of the Pittsburg, Ft. Wayne & Chicago Railroad, two views of which are illustrated herewith, in which has been consumed five thousand tons of merchant plates, angles, etc.

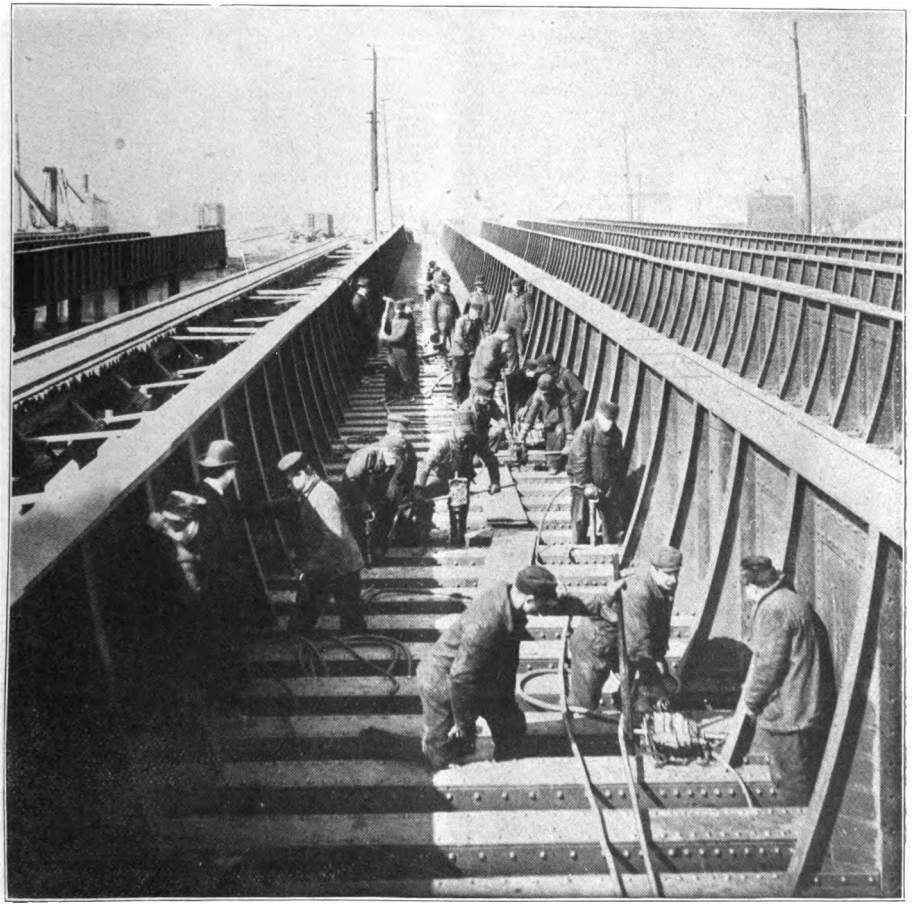
In accomplishing this work, which was performed by the Pittsburg Construction Company under the supervision of Erecting Superintendent M. E. McGiviny, it was necessary to ream 126,000 holes from ¾ inch to 15-16 inch, which was accomplished by the use of nine sizes 0 and 1 Little Giant Air Drills, and into which were driven ⅞-inch rivets by the use of thirteen No. 80 Boyer Long Stroke Riveting Hammers.

The material was hoisted into place by means of two Derrick Cranes, each having a capacity of 25 tons. The work was accomplished without interruption to traffic other than through reduction in speed, the tracks being maintained for use of the company's trains at all times.

The necessary compressed air was supplied by two Franklin Steam Driven Air Compressors.

The floor of viaduct, as will be observed from illustration, is built in the form of a series of troughs about twelve inches in width and of same depth, which are filled with concrete for the purpose of muffling the sound.

A great deal of this work is being carried on at present and engineering students contemplating a railway career can obtain much valuable information by closely observing the methods used in carrying on this important improvement.



VIEW OF TROUGH CONSTRUCTION P. F. W. & C. TRACK ELEVATION WORK.

SOME INTERESTING FACTS ABOUT DIAMONDS.

By Courtesy of Loftis Bros., Diamond Cutters, Chicago.

A CHILD'S DISCOVERY.

"Dars a mooi klippe voor en borst spelt" (There's a pretty stone for a woman's brooch), said the Boer Van Niekerk to the trader John O'Reilly, one October day in 1867, as he pointed to one of the stones with which his child was playing. O'Reilly took it from the child, who had it among his other "marbles," and, finding that it would scratch glass, thought it might possibly be a diamond. He was not sure, however, so he sent it in an unsealed envelope to Dr. Atherstone, an expert mineralogist, at Grahamstone, Cape Colony. It proved to be such a fine diamond that the governor of the colony paid £500 ($2,500) for it. O'Reilly, according to agreement, gave half of the price to Van Niekerk, the child's father.

The news spread and hundreds rushed to the locality on the Orange River where the diamond had been found. The beds of the Orange and Vaal rivers were thoroughly searched for the precious stones. Many of the prospectors were rewarded, but the river diggings have never been as rich as the dry diggings, that is, mines not near running water.

A HUNTER'S FORTUNE.

A young man named Rawstorne, out on a hunting trip, sat down under a thornbush to rest. To pass the time, he scratched away the ground, and to his amazement dug up a beautiful diamond. He had discovered the famous Kimberley mine. Such was the beginning of South African diamond mining.

WHERE FOUND.

All the principal mines are located in or near the city of Kimberley, except Jagersfontein, which is some eighty miles away. The last mentioned mine produces very fine diamonds, but not in great numbers. One of the largest diamonds ever discovered was taken from this mine. It weighs 969½ carats in the rough, having never been cut. It is known as the "Excelsior." (See illustration on other page.)

A soft, yellowish substance which crumbles very readily on exposure is the first layer in a diamond mine. When a depth varying from 65 to 100 feet is reached, a darker and harder vein is struck; this vein, the celebrated "blue earth" of the diamond mine, is of a slate-blue or dark green color. It is greasy to the touch.

DRYING DIAMOND EARTH.

The blue earth is hauled to the surface, where it is exposed to the sun to dry. Miles of country are fenced off and used as drying fields. Here the precious blue earth is spread to a depth

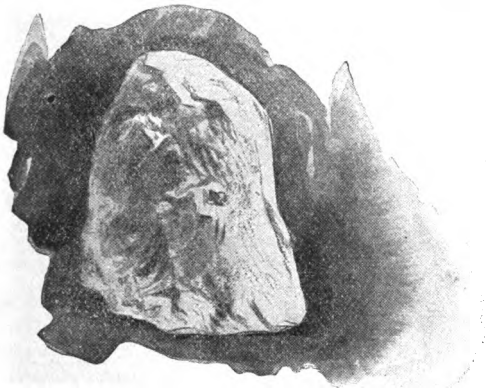
Picking the Diamond from the Boer Lad's "Marbles."

of one to two feet, and harrowed from time to time, until it crumbles. (See illustration.) When the earth has crumbled into a coarse powder, it is placed in rotatory washers and all the lighter materials are washed away. (See illustration.) The residue is next picked over by hand and the diamonds separated. Mining in the early days consisted simply in loosening the blue earth with a pick axe, carrying it to the side of the mine, reducing it to a powder and extracting the diamonds. Some mines were worked faster than others, with the result that the surface became very uneven. (See illustration.) One mine would be worked down to a depth of, say, 100 feet, while its neighbor would only have reached a

depth of 50 feet. Then the sides of the mine, exposed to rain and sun, began to cave in.

DIAMOND CLAIMS.

At first, no more than one claim, measuring 31 by 31 feet, could be held under



The "Excelsior" Diamond (One-half Actual Size.)

one ownership. Even these were often subdivided and claims as small as 6 by 10 feet have been known. It was found necessary to the profitable working of the mines that the claims should be allowed to combine. In 1889 the 3,600 claims in the Kimberley, De Beers, Dutoit's Pan and Bulfontein mines were united in one company — the De Beers Consolidated Mines Company. The market value of the shares in these four companies at that time was about seventeen million dollars.

As soon as consolidation was effected, improved methods of mining were employed. A shaft was sunk at the side of a mine to the level of the blue earth, thus gaining access to the diamond-bearing earth where it was the richest. The yield of these mines, even with the most improved appliances and machinery, is less than one carat per load (1,600 pounds) of blue earth.

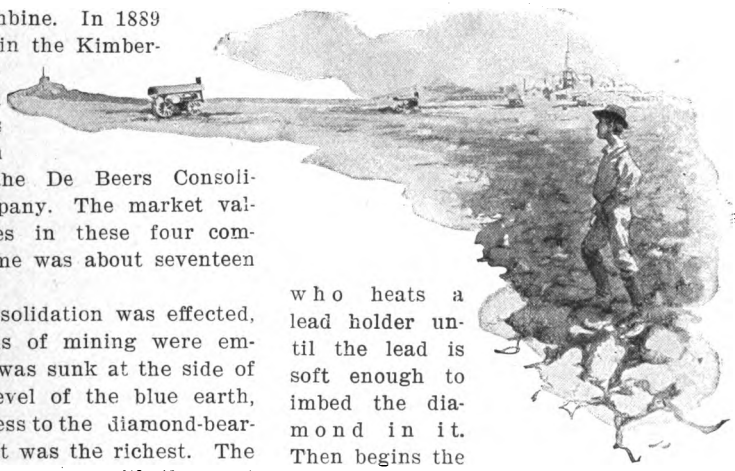
SORTING.

These rough diamonds are all shipped to London, where they are sorted according to size, shape, color, etc., and then sold to the diamond cutters of Amsterdam, Antwerp, Paris, New York and Chicago. The Americans are the greatest diamond lovers in the world, and they want the best, too. They buy, it is true, only about ten per cent of the weight of all diamonds mined, but they insist upon quality and therefore actually buy to the extent of one-half the value of the total product.

DIAMOND CUUTTING.

The present method of cutting diamonds is to remove irregularities until a perfect eight-sided crystal remains. The stone is then cemented to the end of a revolving spindle. Another diamond is then held so that the corners of the revolving diamond touch it. In this way, the stone and the spindle becomes rounded. The fine powder which results from this process is carefully saved. The stone which is round is then used to make another stone round and the top is worn off; this is the cutter's work.

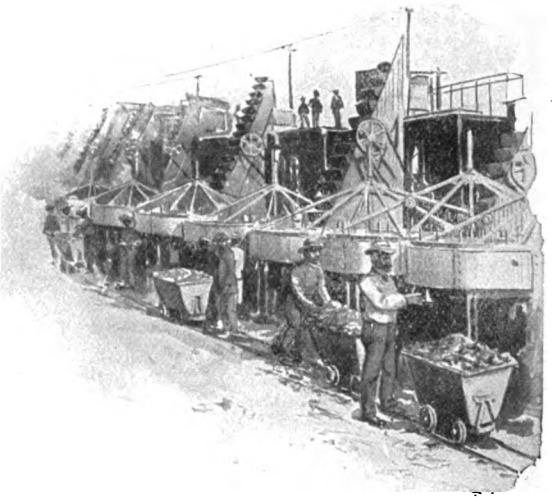
Next the gem is sent to the polisher,



Harrowing Diamond Earth with Steam Traction Engines.

who heats a lead holder until the lead is soft enough to imbed the diamond in it. Then begins the process of making the 56 facets (in addition to the table and culet) into which modern gems are cut. The diamond held in the lead is pressed against a steel wheel revolving horizontally at a speed of three or four thousand

revolutions per minute. The powder resulting from the cutting process is used, mixed with olive oil to wear away the diamond, thus forming each of the facets. Every time a fact is put on, the lead holder must be reheated, the diamond removed and turned to lay the next facet.



Machines for Separating Rough Diamonds from Blue Earth by Washing Process.

FACETS.

First the table (top) is polished on; then the large facets that run from the table to the girdle; then the little ones around the table are laid; next the facet around the girdle, which finished the top of the stone. The bottom of the diamond is finished in a similar way. The stone is always three-fourths buried in the lead holder, yet the polisher is expected to put the facets on with the greatest accuracy. Sixty hours on the wheel is the average time required for polishing a rough diamond weighing two carats. There is great wastage, too. A stone that weighs 2½ carats in the rough will finish a one-carat stone, an actual loss in weight of 60 per cent in producing the modern cut stones.

View of Kimberley Mine, Showing Uneven Depths, Before Consolidation of Claims.

ORIGIN OF DIAMONDS.

Scientists tell us that diamonds were formed ages ago during frightful convulsions of nature similar to volcanic eruptions, but much greater. Tiny bubbles of carbonic gas seeking to escape were imprisoned by surrounding masses of rock and earth. Here, under tremendous pressure, the carbonic gas solidified into crystals of pure carbon, or diamonds. Coal, lampblack, charcoal and graphite are the black sheep of the family of which the diamond is the shining light.

Rough Diamonds Swallowed by Native Miner and Recovered by De Beers Company Guard.

MAN'S FUTILE EFFORTS.

Men have tried to make artificial diamonds, but they have never met with any degree of success. One of the most interesting experiments in that direction is described as follows: A crucible is

filled with molten iron; some sugar of carbon is plunged into the center. The whole mass is then put into cold water, causing a hard shell to form on the outside. The iron, still molten inside, expands with great force at the moment it solidifies, and the carbonic gas under this great pressure changes into minute crystals, or diamonds. They are too small for commercial purposes, and besides it is necessary to eat away the solid iron with acid to get at them. Whoever perfects a process for producing artificial diamonds of commercial value will, of course, reap an unlimited fortune, but all the efforts of ancient alchemists and modern science in that direction have failed. Diamonds, like gold, are one of Nature's secrets, and man is as far as ever from fathoming them.

THE WILLIAMSBURG BRIDGE ACROSS THE EAST RIVER.

The construction of the suspension bridge over the East River, which was opened to the public with appropriate ceremonies on December 19, says the Railway Critic, was authorized under the provisions of Chapter 789 of the Laws of 1895, and approved by the Governor of New York May 27 of that year. In accordance with those provisions six commissioners were appointed, three each by the mayors of Brooklyn and New York, the two mayors acting as ex-officio members.

Before the construction of the bridge could be started it was necessary for the cities to purchase charter rights owned by the East River Bridge Company to build in this locality and on December 18, 1895, the Bridge Commissioners purchased all the rights of said company for the sum of $200,000.

The route of the bridge is parallel with Delancey street, the northerly line corresponding with the southerly house line of Delancey street, and extends to a point in Brooklyn on South Fifth street about 200 feet east of Driggs avenue. Two full blocks and parts of two others have been taken in Brooklyn for a plaza.

The general plan of the bridge was adopted by the commission on August 16, 1896, and filed in the Department of Public Works in Brooklyn and New York, and as first adopted its center line was straight from the end in New York to a point a short distance east of the Brooklyn anchorage and from there it curved to the north and ran parallel with and along the southerly house line of South Fifth street.

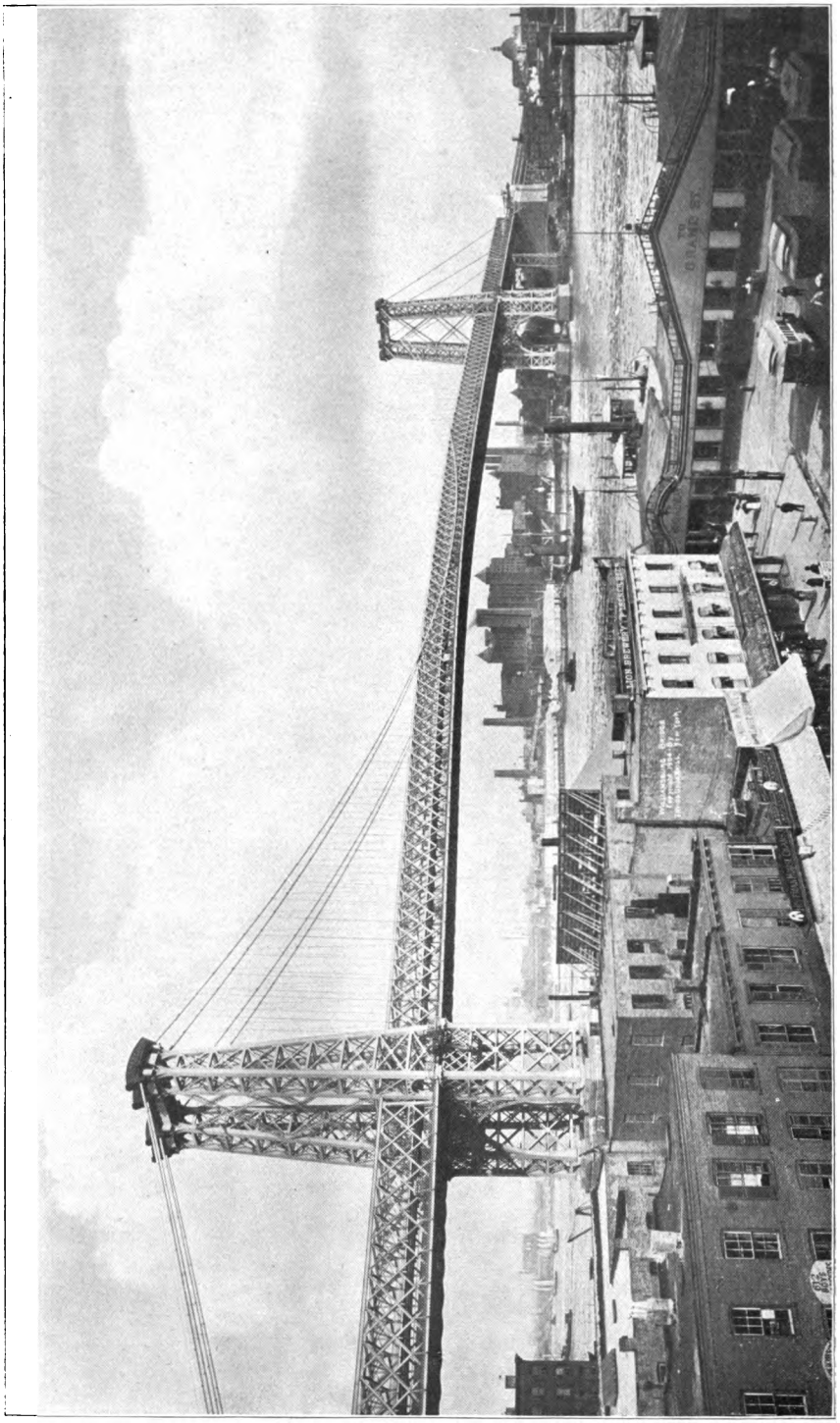
The Bridge Commission, through a special act of the State Legislature, was authorized to occupy certain portions of South Fifth street, Brooklyn, and an amended plan was prepared making the line of the bridge straight from end to end, and adopted in May, 1897.

On January 18, 1898, a new commission of six members was appointed under the Greater New York charter, which served until January 1, 1902; the revised charter, which went into effect that day, provided that the Williamsburg bridge in common with all other city bridges should be constructed and operated under the supervision of the Commissioner of Bridges.

Extensive diamond drill borings were made on both sides of the river at the sites of the tower foundations during the summer of 1896. The first actual work on the bridge was begun on October 28, 1896, when the Manhattan tower foundations were commenced. The tower foundations on both sides of the river rest on solid rock; the north pier on the Manhattan side at a depth of fifty-six feet and the south pier at a depth of sixty-six feet below mean high water. On the Brooklyn side the south pier extends to a depth of about ninety feet, and the north pier to a depth of about 110 feet below mean high water.

On the Brooklyn side the tower foundations are composed of granite and limestone masonry from the top of masonry piers at twenty-three feet above to about forty-seven feet below mean high water, and from that point to the bottom the foundations are composed of concrete.

On the Manhattan side the tower foundations are composed of granite and



VIEW OF NEW WILLIAMSBURG BRIDGE FROM BROADWAY, BROOKLYN.

limestone masonry at twenty-three feet above, to about thirty-five feet below mean high water, and from that point to the bottom the foundations are composed of concrete.

The Manhattan anchorage rests on a timber grillage platform, supported on 3,500 piles driven through clay to a bed of sand overlying the rock, and contains about 43,300 cubic yards of limestone and granite masonry and 16,400 cubic yards of concrete.

The Brooklyn anchorage rests on a timber grillage platform and concrete foundations overlying the natural sand foundation, and is composed of about 45,000 cubic yards of limestone and granite masonry and about 10,000 cubic yards of concrete.

Each anchorage contains about 1,680 tons of steel anchor chain bars and girders, and is floored over with steel girders and brick arches overlaid with concrete.

The steel towers were completed about January 1, 1901, and the end spans, between the main towers and anchorages, about May 1, 1901.

The first wire rope for the construction of the temporary foot bridges, used in stringing the cables, was hoisted to place on April 11, 1901, and the first wire for the permanent cables crossed the river on Friday, November 29, 1901. The stringing of the wires of cables was completed June 27, 1902. The cables were completed in August, 1902, ready for the suspenders, and on Monday, November 10, 1902, the suspenders were nearly all in place and everything was about ready for the commencement of the erection of the suspended span; but at 4:30 p. m. of that day a fire occurred on top of the Manhattan tower, which destroyed the timber platforms and framework used in cable making on the south end of the tower and heated the cables supporting the foot bridges to such an extent that they parted, allowing the foot bridges to fall. New working platforms were required to complete the work on the cables and were constructed along the main cables, and the wrecked foot bridges removed, so that the work of erecting the suspended span was begun without much delay.

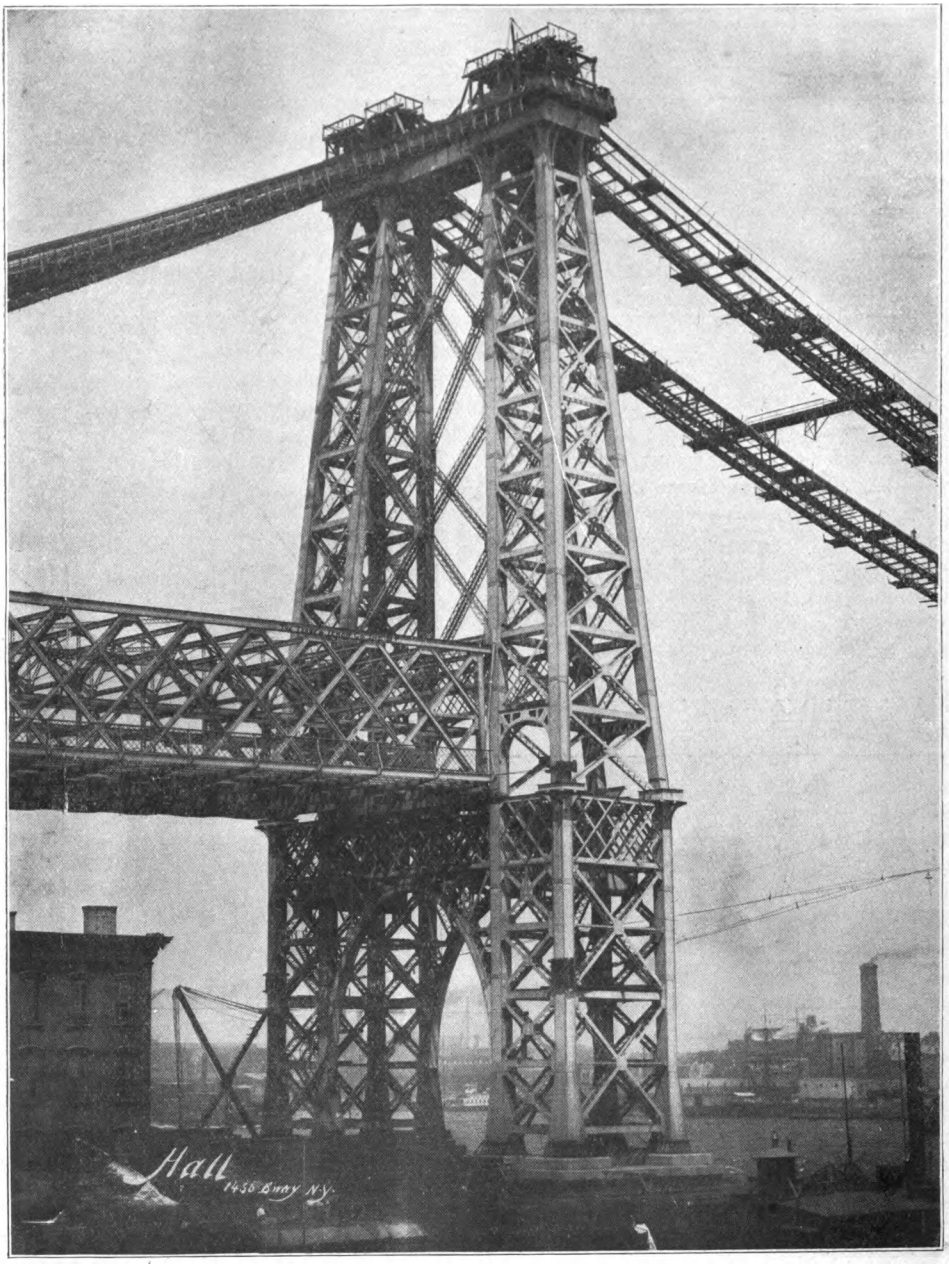
A commission was appointed, composed of Messrs. L. I. Buck, George S. Morrison and C. C. Schneider, to investigate the damage done to the main cables on top of the Manhattan tower, and report a method of repairing. A thorough examination was made of the cables by the bridge engineers, under the direction of this commission, and the extent of damage, which was confined to the two southerly cables, was determined. The south outer cable was damaged only on its upper side and over the saddle. The number of affected wires was found to be about 175. In the south inner cable the damage extended on the top side of the cable over the saddle and round the underside of the cable east of saddle. On top of the saddle about 160 wires were damaged, and around the cable at end about 300 wires.

As recommended by the commission, the damaged wires on top of both cables were cut out and new wires spliced in and connected by the regular sleeve nut splices used throughout the cables. As it was impossible to renew the damaged wires under the south inner cable east of the saddle, the commission directed that the loose wires be cut shorter and spliced, and that a sufficient number of reinforcing wires be applied and fastened to the cable by friction clamps or bands at each end of the saddle and extending over same, and also an additional number of wires were fastened in the same manner to make up for the loss of strength due to field splicing of the wires over the saddle, amounting to 5 per cent.

Twenty reinforcing wires were attached to the south outer cable and 180 reinforcing wires to the south inner cable, by means of the friction clamps, and also wrapped with wire to increase the frictional resistance. It is estimated that the cables at this point now are as strong as before.

The erection of the main suspended span was begun on January 15, 1903, and fully completed about December 1, 1903.

The construction of the steel and masonry approaches on both sides of the river, the contracts for which were let November 7, 1900, has been somewhat delayed on account of delays in acquiring property and by the work of other contractors, but the work on them, which has been done by the same con-



WILLIAMSBURG BRIDGE AFTER THE FIRE.

tractor who constructed the suspended span, has been conducted in such a manner that the three contracts have been completed at practically the same time.

It was decided in 1903 to adopt fireproof floors for the carriage ways from anchorage to anchorage, and contract was let June 8, 1903, which provided for a steel underflooring composed of twelve-inch channels, upon which is laid creo-resinate wood block paving. The carriage ways on the approaches are paved with Medina sandstone blocks, laid on concrete foundations. The south carriage way was completed and opened to traffic December 19, 1903, and the north carriage way was opened soon afterward.

Fireproof floors were also adopted for the footwalks, and October 20, 1903, contract was let for laying these floors, consisting of corrugated steel underflooring, over which is laid concrete and rock asphalt mastic wearing surface. It is expected that the footwalks will be opened from end to end of bridge about May 1, 1905.

Under the Manhattan approach four blocks have been asphalted for use of push-cart stands. One block has been assigned to the fire department for fire house, and the rest of the approach has been placed at the disposal of the Department of Parks for park purposes. The property under the Brooklyn approach has been placed under the control of the Department of Parks for park purposes, and walks, etc., have been laid out. The buildings have been removed from the Brooklyn plaza area and the contract is under way for grading and paving same. Plans have been prepared by the consulting architect for the embellishment of this area, including the construction of comfort stations and shelter houses.

The contract for all material and labor for installing the tracks for the New York City Railway Company was awarded to Snare & Triest Company, August 10, 1904, and was completed about January 29, 1905. In this interval they have furnished and installed 850 tons of rails, 900 tons of steel and cast iron yokes, 450,000 feet B. M. creosoted lumber, as well as all the special construction connected with this contract. The connections between the steel yokes and bridge were all riveted.

Table of Data.

Length of main span, center to center of towers, 1,600 feet.

Length of entire bridge, 7,200 feet.

Width of bridge, main span over all, 118 feet.

Height of bridge above high water at pier headlines, 121 feet.

Height of bridge for 400 feet over middle of river, 135 feet.

Height of masonry towers above high water, 23 feet.

Height of cables at towers above high water, 333 feet.

Width of each of two carriage ways, 20 feet.

Number of trolley tracks, 4.

Number of elevated railway tracks, 2.

Weight of steel in each tower, 3,048 tons.

Weight of steel in end spans, both sides of the river, 6,140 tons.

Weight of steel in Brooklyn approach, 6,085 tons.

Weight of steel in Manhattan approach, 10,550 tons.

Weight of steel in main span, 7,772 tons.

Weight of steel in cables and fittings, 5,000 tons.

Diameter of cables, outside of wires, 18¾ inches.

Number of wires in each cable, 7,696.

Size of each wire in cable (No. 6), about 3-16 inch.

Length of each of the cable wires, about 3,500 feet.

Quantities of material used in the bridge—Timber, about 8,000,000 feet B. M.; excavation, about 125,000 cubic yards; concrete masonry, about 60,000 cubic yards; stone masonry, about 130,000 cubic yards; steel, about 45,000 tons.

The following table shows the number of contracts and how they were placed:

CONTRACT	CONTRACTORS	DATE	AMOUNT
New York Tower Foundations	P. H. Flynn	Nov., 1896	$373,462 71
Brooklyn Tower Foundations	Colin McLean	July, 1897	485,082.75
New York Anchorage	Shanly & Ryan	Oct., 1897	802,770.00
Brooklyn Anchorage	Degnon-McLean Construction Co	Oct., 1897	771,778.00
Steel Towers and End Spans	N. J. Steel & Iron Co	Feb., 1899	1,221,726.60
Steel Cables, etc	John A. Roebling's Sons Co	Dec., 1899	1,462,440 00
Manhattan Approach	Pennsylvania Steel Co	Nov., 1900	1,535,090.00
Brooklyn Approach	Pennsylvania Steel Co	Nov., 1900	976,220.00
Suspended Structure	Pennsylvania Steel Co	May, 1901	1,123,400.00
Steel under Flooring for Carriageways	R. H. Hood Co	June, 1903	167,026.70
Creo-Resinate Wood Block Pavement for Carriageways	U. S. Wood Preserving Co	June, 1903	31,989.00
Cement Concrete "Kosmocrete" Sidewalks and Asphalt Paving under Manhattan Approach.	United Engineering & Contracting Co	July, 1903	71,465.00
Roadway (Carriageway) Pavement, etc., on Approaches and Anchorages	United Engineering & Contracting Co	Sept., 1903	149,435.00
Concreting in Anchor Chain Tunnels	John J. Hopper	Sept., 1903	73,900 00
Footwalk Flooring, etc	R. H. Hood Company	Oct. 1903	138,400.00
Comfort Stations on Anchorages, etc	Snare & Triest Co	Nov. 1903	176,400 00
Grading and Paving Brooklyn Plaza	Cunningham & Kearns Contracting Co	Nov., 1903	66,347.00
Electric Wiring, Fixtures, etc., for Lighting the Bridge	Commercial Construction Co	Dec., 1903	18,000.00
Hoods over Cable Saddles, etc., on Towers		Dec. 1903	

A WORD OF PRAISE.

To Eccles & Smith, Seattle, Wash.

Gentlemen:—We wish to say a word for Pneumatic Tools, which we hope will not be out of place inasmuch as we consider that we were the first Contractors on the Pacific Coast in our line to adopt these Tools and make a success of them in connection with Gasoline Compressors.

We now have had these tools in constant operation for three years on some very heavy work and with some little repairs they are doing excellent service yet. Last season we did a heavy job of reinforcing in Montana on the Marent and O'Keefe Viaducts on the line of the N. P. Ry. We drilled and drove something over one hundred thousand ⅞ rivets in the field.

This would have been an impossibility without Pneumatic Tools, both as regard cost and the time it would have taken, as this work had to be done and maintain a very heavy traffic. We having had to drill six hundred holes and drive as high as six hundred rivets between trains, which we were not allowed to hold exceed three hours.

We use the Little Giant Drills and the Boyer Hammers throughout on this work, and we are certain that we cannot say too much in regard to the efficiency of these Tools when properly handled.

Yours truly,
M'CREARY & WILLARD,
Contractors.

SAND RAMMERS USED IN LINING CONVERTERS.

Since Pneumatic Tools have come in use they have been constantly finding their way into new fields. This speaks well for Compressed Air as a desirable power, as in many cases it was sought by many who had certain work to do and wondered if Compressed Air could not be put into practical use to accomplish the thing sought to do, and it may be safe to say that a number of the pneumatic devices have been invented and placed on the market for sale through some one making inquiries as to whether or not Compressed Air could not be utilized for their purpose and put in shape to do their work. The Compressed Air expert in most cases would seize the idea and proceed to invent something which would do the required work, and the result has been most gratifying in almost every undertaking.

One by one Pneumatic Tools and Appliances have made their way into the Foundry for chipping castings, sifting sand, sand ramming and the latest use that the so-called Sand Rammer has been put to is in lining converters in Smelters, and by the aid of these tools the 'packing and tamping can be done in a much more substantial manner. For this purpose they have been used with remarkable success, and at a great saving of time and money.

Chicago in 1803 had a population of 75. In 1903 the population is 2,231,000. The area of the city is 191 miles, measuring twenty miles from north to south. The longest street, Western avenue, is twenty-two miles long. The total street mileage is 2,798.

Chicago is fed by 4,532 grocers, 1,578 butchers and 826 bakers.

Chicago has 3,194 policemen. Each square mile is protected by fourteen officers.

Chicago's fire department has 1,198 men. Last year they saved 144 lives. The total value of the department's property is $2,090,560. During 1902 5,125 fires occurred, involving property of the total value of $112,998,325. The loss over insurance was $513,628.

Chicago has 191,874 miles of water pipe, with a water works that pumped and distributed last year 130,892,288,020 gallons.

Chicago's running expenses last year were $15,065,428.99. It required 15,910 people to transact the city's business.

Cnicago has 299 hotels, 868 apartment houses, 1,290 furnished room establishments; 40,000 men call cheap lodging houses "home" and 11,000 homeless men were fed and sheltered by the municipal lodging house.

Chicago women are clothed by 3,175 dressmakers. For the Chicago man there are 5,802 saloons, 60 asylums, 76 pawnshops, 37 cemeteries, 140 constables, 4,071 lawyers, 395 artists, 477 watchmakers and jewelers, 353 architects, 1,920 barbers, 193 photographers, 11 express companies, 1,224 cigar stores, 366 office buildings, 630 laundries, 217 of which are Chinese; 62 chiropodists, 18 Chinese stores, 33 caterers, 757 carpenters and builders, 49 cabinet makers and 113 building and loan associations.

Chicago is the greatest inland port in the world. Import duties last year amounted to $9,565,452; 7,179,053 tons of merchandise were received, 7,395,207 barrels of flour were received and 5,839,441 barrels shipped; 185,537,374 bushels of grain were handled. Dressed beef to the amount of 1,049,801,765 pounds, 909,918 cattle, 831,728 sheep, 1,251,798 hogs, 150,615 pounds of dressed pork, 382,498,069 pounds of lard and 660,869,799 pounds of meats in various forms were shipped out of Chicago during 1902. The total grain shipment last year was 245,207,653 bushels.

Chicago has 15 national and 36 state banks and trust companies. In the city are 20,000 manufacturing plants, which make products valued at $1,000,000,000 annually, with an invested capital of $600,000,000, paying $200,000,000 in salaries. In 1902 the clearings of the associated banks amounted to $8,394,872,351.59; the balances were $653,199,396.54.

Chicago's death rate is 16.2 per thousand. There are 3,192 doctors, whose prescriptions are filled at 922 drug stores, while 1,175 dentists look after the teeth.

Chicago has 535 boarding houses, 106 employment agencies, 213 florists, 31 theaters, 126 chemists, 15 claim agents, 98 clairvoyants, 23 dermatologists, 717 trained nurses, 2,446 confectioners, 10 professional translators and 357 undertakers.

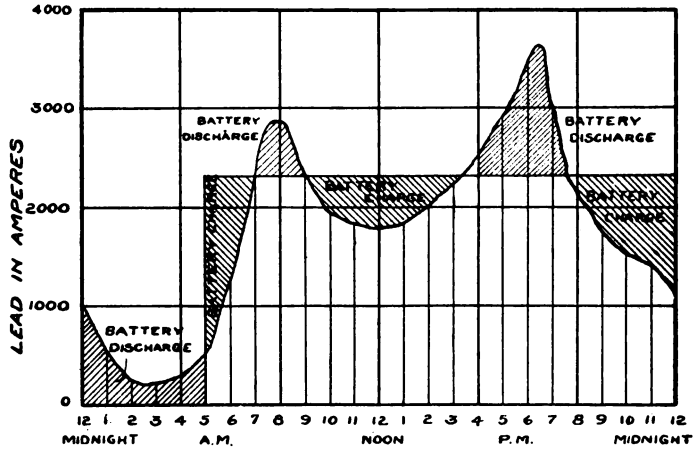
Chicago has 780 churches, 29 convents, 21 libraries, 58 hospitals, and 292 public schools, attended by 275,000 children. The public library was used last year by 121,239 readers, to whom 1,751,498 volumes were issued.

Chicago as a name was evolved from Che-caugou, an Indian word. Translated it means strong, mighty. A list made up from early postoffice records discloses the following wonderful and interesting variations: Chicago, Chikilgo, Sheskawgin, Shiggogo, Sikago, Schikago, Shigaco, Chickagoe, Chikalo, Chookago, Chicgago, Schigacho, Schikako, Cillikogo, Chicvago, Chicopo, Chicowgo, Shegargo, Secago, Schegargo, Cheekoge, Chigo, Chichago, Chicaugo, Chuago, Schekoga, Chioga, Chicugo, Chicgo, Chicawgo, Sckicago, Sigago, Chechaugor, Chihago, Cnichaigoe, Chigogoue, Shilgogu, Schickaukoy, Chilhago, Schicaco and Schukgago.

Chicago has but one pneumatic tool company.

STORAGE BATTERIES.

We have all heard and still hear a great many statements in regard to the unreliability and inefficiency of the storage battery. These statements are usually made by persons who know very little of what is being accomplished by means of the storage battery today, or by persons who have had experience with the poorer grades of batteries with which the market is flooded. As a matter of fact, the storage battery has so increased the efficiency and general utility of most of our large central stations as well as many smaller industries as to be practically indispensable.



In nearly all of the electrical power stations furnishing current for general power and lighting or for street railway or suburban work, the load varies through a very great range during the day. The accompanying curve shows how the load may vary in a power station.

The vertical height of the curve at any point represents the amount of load in amperes at the time indicated on the horizontal line directly below that point. As shown by the diagram the engines and dynamos were started at 5 a. m. and a constant load of about 2300 amperes was carried from then until 12 midnight. The surplus current from 5 a. m. to 7 a. m. was stored in the battery, which helped out the dynamos from 7 a. m. to 9 a. m., when the load exceeded their capacity; and the charging and discharging process continued as indicated by the curve until 12 midnight, at which time the plant was shut down and the load carried on the batteries alone until 5 a. m., when the dynamos were again started. Without a storage battery it would be necessary to have boilers, engines and generators of sufficient capacity to furnish power for the maximum load, with the result that at the minimum load the plant would be operating at an extremely low efficiency. By the use of a storage battery a much smaller steam and electric plant can be installed, because at the time when a small amount of current is being used on the lines, the engine and electric generator can be operated at their highest efficiency, storing the surplus current in the battery for use when the load exceeds the capacity of the generating plant. The battery is arranged to float on the line and give up and receive its current automatically. The battery has the further advantage of being able to carry the full or partial load of the station for a short time, depending upon its size, in case of a breakdown of the generating plant or the necessity for cleaning or repairs to same. A recent instance of this was the carrying of the whole load of the south side of

Chicago, amounting to 5200 amperes, for several hours, by the Chicago Edison Co.'s storage battery, on account of a breakdown in the station. The first cost of the battery is less than that of the boilers, engines and dynamos which it replaces, and the interest on the difference in investment together with the saving in the cost of repairs and maintenance is large enough to show a handsome increase in dividends, which is the prime reason why hundreds of thousands of dollars are invested in storage batteries for central station work.

Storage batteries which have proven of such great advantage in power station practice, are used for train lighting, electric vehicles and launches, for sparking gas or gasoline engines and for telegraph, telephone and signal work, with such changes as are required to meet the varying conditions and still maintain a high efficiency and long life.

For train lighting, batteries are fast superseding the old-time gas and oil lighting system, with a resulting economy in operation, more satisfactory illumination and freedom from danger of fire. These batteries are charged at the railway terminals and used alone for furnishing current; or they are used on the train in conjunction with dynamos in the baggage car, or mounted on the car axles, the batteries furnishing current when the train is standing and maintaining a constant voltage regardless of train speed, thus insuring steady light.

For heavy freight trucks electricity has been found far superior to any other means of propulsion, and a special battery has been developed for this class of work, as well as for pleasure vehicles and electric launches.

The sparking of gas and gasoline engines has been accomplished by means of small dynamos, primary batteries and storage batteries. The storage battery has proven the most satisfactory device, principally on account of its reliability and long life. When a dynamo is used, it is necessary to have a set of primary batteries or a storage battery in addition to furnish current for producing the spark when starting the engine before the dynamo gets up to speed. The storage battery thus eliminates the dynamo and is always ready for operation. It is safe to say that the majority of gasoline automobiles in use today are using storage batteries for ignition purposes.

For telegraph, telephone and signal work, the storage battery is rapidly displacing the primary battery. The chief reasons for this are the small amount of space required, the constance of E. M. F. or electrical pressure, the freedom from troubles due to creeping salts, the cleanliness and great saving in cost of maintenance. A higher E. M. F. per cell is obtained, thus requiring fewer cells than the primary battery and a saving approximating $1.00 per year per cell in the cost of maintenance and repairs, are very important considerations.

The Little Giant Storage Battery Co. 1255 Michigan Ave., Chicago, are manufacturing a superior type of storage battery for each of the uses described above and are meeting with great success in these lines.

ERRATO.

Mr. W. H. Woodward, President of the Woodward Construction Co., Birmingham, Ala., calls our attention to an error which occurred in the March issue of Ideal Power under caption of Electricity an Ideal Power in Its Place.

Mr. Woodward states that in this mine accident in Virginia City, Alabama, 111 lives were lost instead of 160, as we had it. He also states that the mine was not operated by Electricity, as Steam Hoisting Machinery of the common kind was used and that coal trains were transported to the incline by mules.

In the February issue of Ideal Power, we stated that Sir William Arrol & Co., Ltd., of Glasgow, England, were the designers and builders of the Caledonian Bridge, which is an error and the credit should be given to Mr. Donald A. Matheson, C. E., in the Engineering Department of the Caledonian Railroad Company, who is entitled to the credit forsame.

ELECTRICITY IN FACTORIES.

It is a very rare thing at the present time to find a factory of any magnitude that is not using electricity for lighting purposes taking current either from its own or a central station. The great superiority of electricity as an illuminant was early recognized and the perfecting of both the incandescent and the arc lamp has led to its widespread adoption by the leading manufacturers throughout the world and has revolutionized the whole art of illumination.

The progress made by the electric motor in its application to the factory uses has been less rapid and it is only within the last few years that its great advantages over other methods of power transmission have begun to be appreciated. With the exception of compressed air, which for certain specific uses occupies a place peculiarly its own, electricity is probably the best adapted means of power-transmission for general factory purposes. It permits of the centralization of the power plant in large factories, thereby effecting great saving in fuel and attendance. The ease with which the electrical output of the plant or any part of it may be measured by means of the ammeters, voltmeters and wattmeters now in such general use, provides an effective and simple way of keeping track of the cost of power and making comparisons of the various grades of coal and men.

The use of individual motors permits of the distribution of energy throughout the factory with a loss which is but a small fraction of that consumed by shafting and belting. The absence of the latter affords clear overhead room for travelling cranes, or hoists, and leaves an unobstructed path for light. In textile factories the use of shafting and belting results in considerable damage to material coming into contact with greasy belts, from oil dropping on it or from dust which is carried up from the floor and distributed around the room. This is all overcome by the use of individual electric motors. The variation in speed and reversible direction of rotation which can be obtained so easily by electrical means, also greatly increases the utility of the electric motor.

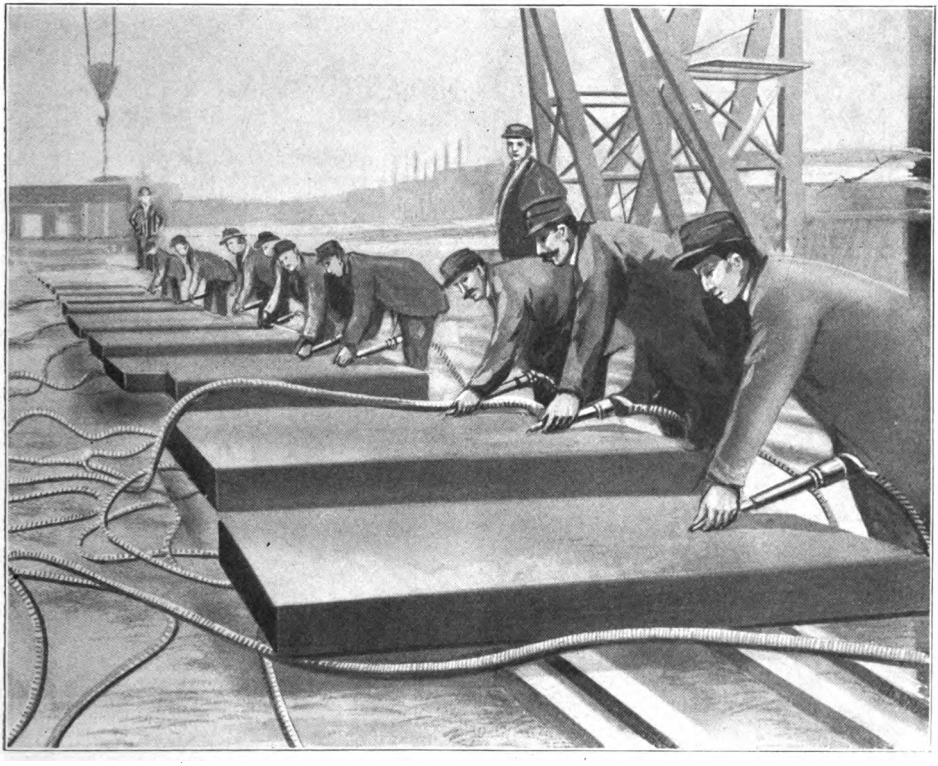
Perhaps the greatest strides in the use of motors for commercial purposes have been in their application to machine tools. Nearly all of the advantages previously mentioned apply here with the addition of several others of great importance. The concentration of plenty of power near the machine, effectively applied to it, with a generous range of speed control, together with the new high speed tool steels, has so increased the output as to seem almost incredible. The demand for speed variation has brought out a number of ingenious mechanical devices of more or less merit, but it was clearly "up to" the electrical engineer to devise means of accomplishing this electrically and with a high efficiency. This has been done by a number of very ingenious methods, most important of which are the multiple voltage system and the field control system. The former involves the use of special generating apparatus and a special system of wiring throughout the factory. It also requires special and very complicated starting and controlling apparatus, so that the installation of this system means a high first cost. The field control system requires but two wires as in any ordinary electrical installation and the starting and controlling mechanism is nothing more than an ordinary starting rheostat in combination with a variable field resistance. With this method of control speed ranges of four to one can be obtained with motors having one commutator and eight to one with motors having two commutators.

The economy and convenience of electric power for factory use is becoming so apparent to all business men that the application of electric motors is considered, if not adopted, for all new enterprises and, in our judgment, it will be a matter of only a few years when the majority of existing plants otherwise driven will change over.

THE BOYER CHIPPING HAMMERS CHIPPING SLABS IN ONE AMERICA'S LARGE STEEL PLANTS.

The accompanying cut is from a photograph taken in the billet yard of one of America's largest steel plants, where the Boyer Chipping Hammers are used for chipping flaws from Ingots, Blooms Slabs and Billets before they are rolled into merchant shapes.

The chipping of flaws from Ingots, Blooms, Slabs and Billets is one of the important features in connection with the manufacture of steel, and the figures in connection with the work prior to, and after, the use of the pneumatic hammers are extremely interesting, and will be conveyed to any one sufficiently interested who may write Ideal Power for the information.



BOYER CHIPPING HAMMERS CHIPPING FLAWS FROM SLABS.

The slabs illustrated are of unusual size, the dimensions of which are approximately one foot thick, four feet wide and six feet in length, and the opportunity of illustrating the extremely heavy duty to which these small pneumatic hammers are subjected, is so rare, that the illustration should prove of considerable interest.

There are many places where these hammers can be used with equally as good results and at a considerable saving in both time and labor, and yet while the saving may not be so apparent as in this particular case, it would in the course of a very short period pay for the equipment.

Subscribe for Ideal Power to-day

The Standard Tool Co.'s Reamers

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PNEUMATIC TOOLS

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All sizes have five flutes. Ends are tapered to facilitate entering the work. Have taper or square shanks. For aligning rivet and bolt holes and similar work.

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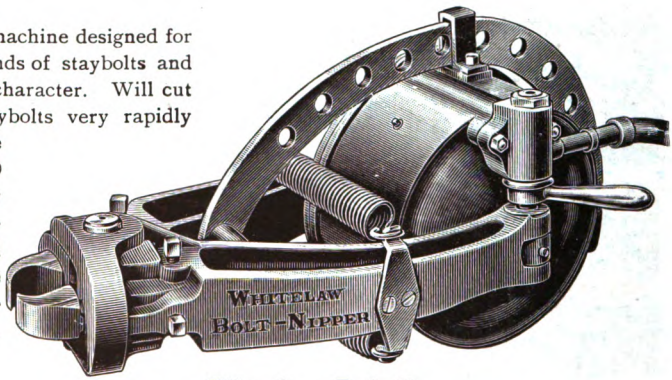
With the Whitelaw Bolt-Nipper and it will be your Standard Nip(per).

An excellent machine designed for cutting off the ends of staybolts and work of similar character. Will cut off 1¼-inch staybolts very rapidly at an air pressure of from 80 to 90 pounds. Very simple in construction and does not require a skilled mechanic to operate it.



Whitelaw Bolt-Nipper

CHICAGO PNEUMATIC TOOL CO.

FISHER BLD'G. CHICAGO. 95 LIBERTY ST. NEW YORK.

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IDEAL POWER

A MONTHLY MAGAZINE
DEVOTED TO COMPRESSED AIR AND ELECTRICAL APPLIANCES

Vol. 2 JUNE, 1905 No. 3
Subscription Price, 10c. Foreign Countries, 25c.

CONVENTION DATES.

Master Steam Boiler Makers' Association, Chicago, June 5, 6, 7 & 8, 1905.

June 13th—American Association of Local Freight Agents' Associations, at Minneapolis, Minn.

Eastern Association of Car Service Officers, New York, June 8, 1905.

American Order of Steam Engineers', Philadelphia, Pa., June 12-15, 1905.

American Association of General Baggage Agents, Cleveland, Ohio, June 14, 1905.

American Railway Master Mechanic Association, June 14-16, 1905, at New York.

Train Dispatchers' Association of America, Denver, Colo., June 20, 1905.

Master Car Builders' Association, Manhattan Beach, Long Island, N. Y., June 19 to 21, 1905.

Association of Transportation and Car Accounting Officers, Toronto, Canada, June 20, 1905.

American Institute of Electrical Engineers,' Asheville, N. C., June 19 to 24, 1905.

Central Association of Railroad Officers, St. Louis Div., Kansas City, June 12, 1905.

Association of American Railway Accounting Officers, New York, June 28, 1905.

June 29—American Society for Testing Materials, at Atlantic City, N. J.

American Boiler Manufacturers' Association, Toronto, Canada, July 25, 26 and 27, 1905.

National Association of Stationary Engineers', Louisville, Ky., August 1 to 5, 1905.

National Railroad Master Blacksmiths' Association, Cleveland, Ohio, August 15, 1905.

August 16—National Convention of Railroad Commissioners, at Deadwood, S. D.

Road Master and Maintenance of Way Association, Niagara Falls, N. Y., September, 12th, 1905.

American Association of Traveling Passenger Agents, Portland, Oregon, September, 1905.

Traveling Engineers' Association, Detroit, Mich., September 12th, 1905.

Master Car & Locomotive Painters' Association of the U. S. and Canada, Cleveland, Ohio, September 12 to 15, 1905.

International Union of Steam Engineers', Toronto, Canada, September 11 to 16, 1905.

American Association of Railway Surgeons, Chicago, October, 1905.

Canadian Road Masters' Association, Toronto, Jct., Ontario, October, 1905.

American Association of General Passenger and Ticket Agents, City of Mexico, Oct. 17, 1905.

Association of Railway Superintendents of Bridges and Buildings, Pittsburg, Pa., October 17 to 19, 1905.

Southern and Southwestern Railway Club, Atlanta, Ga., Nov. 21, 1905.

Association of Maintenance of Way Master Painters, (U. S. & Canada,) Cincinnati, Ohio, Nov., 21 and 22, 1905.

Engine Builders' Association, New York, December, 1905.

American Society of Mechanical Engineers' New York, Dec. 5 to 8, 1905.

Western Railroad Association, Chicago, January, 1906.

Engineering Societies.

American Railway Mechanical and Electrical Association, Sec., Walter Mown, 13 Woodward av., Detroit, Mich.

American Society of Heating and Ventilating Engineers' Sec., W. M. Mackay, P. O. Box 1818 New York City.

American Society of Mechanical Engineers—Pres. John R. Freeman, Providence, R. I.; Sec., F. R. Hutton, 12 W. 31st st., New York; permanent headquarters, 12 W. 31st st., New York.

American Society of Naval Engineers—Navy Dept., Washington, D. C.—Pres. A. F. Dixon, Commander, U. S. N.; Sec. and Treas., Chas. K. Mallory, Lieut. U. S. N.

American Boiler Manufacturers' Association Pres. R. Monroe, Jr., Pittsburg, Pa.; sec., J. D. Farasey, Cleveland, Ohio.

American Institute of Electrical Engineers—Sec., R. W. Pope, 95 Liberty st., New York.

American Order of Steam Engineers—Supr. Chief Engr., Hiram M. Trout, Reading, Pa.; Supr. Cor. Engr., C. Ling, 306 Lippencott Building, Philadelphia, Pa.

Association of Edison Illuminating Companies—Sec., W. H. Johnson, Philadelphia, Pa.

Canadian Electrical Association—Sec., C. H. Mortimer, Toronto, Ont., Can.

Canadian Association of Stationary Engineers—Pres., Chas. Moseley, Toronto; Sec., W. Inglis, 554 Bloor st. W., Toronto, Ont., Canada.

Engineers' Association of the South—Sec., R. L. Lund, Nashville, Tenn.

Engineers' Club of Philadelphia—Pres., Edgar Marburg; Sec., J. O. Clarke; house, 1122 Girard St.; regular meetings 1st and 3d Saturdays.

Engineers' Society of Western Pennsylvania—Pres., Jas. M. Camp; Sec., Charles Ridinger, Pittsburg. Meetings, third Tuesday of each month.

Engine Builders' Association of the U. S.—Pres., C. A. Gates; Sec., J. I. Lyle, 39 Courtland st., New York.

International Union of Steam Engineers—Sec., R. A. McKee, Masonic Temple, Peoria, Ill.

Master Steam Boiler-Makers' Association—Sec., Geo. M. Clark, 1377 North Maplewood av., Chicago, Ill.

National Electric Light Association—Pres., Chas. L. Edgar, Boston; Sec., Dudley Ferrand, Newark, N. J.

National Association of Stationary Engineers—Pres., C. F. Wilson, Milwaukee, Wis., Sec., F. W. Raven, 140 Dearborn st., Chicago, Ill.

Ontario Association of Stationary Engineers—Pres., F. W. Donaldson; Registrar, J. G. Bain, 113 Yorkville, Av., Toronto, Ont., Canada.

Universal Craftsmen Council of Engineers—Chief Engineer John H. Leathers, Rochester, N. Y.; Sec., Chas. E. Davey, Federal Building, Detroit, Mich.

Western Society of Engineers—Pres., H. W. Parkhurst; Sec., J. H. Warder, 1737 Monadnock Block, Chicago, Ill.

IDEAL POWER

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G. A. REES, Editor.

June, 1905. Vol. 2. No. 3.

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Other Countries in Postal Union, 25 cents per year.

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THE CARE OF PNEUMATIC TOOLS.

The care of pneumatic tools is an absorbing question, and cannot receive more attention than the gravity of the case demands.

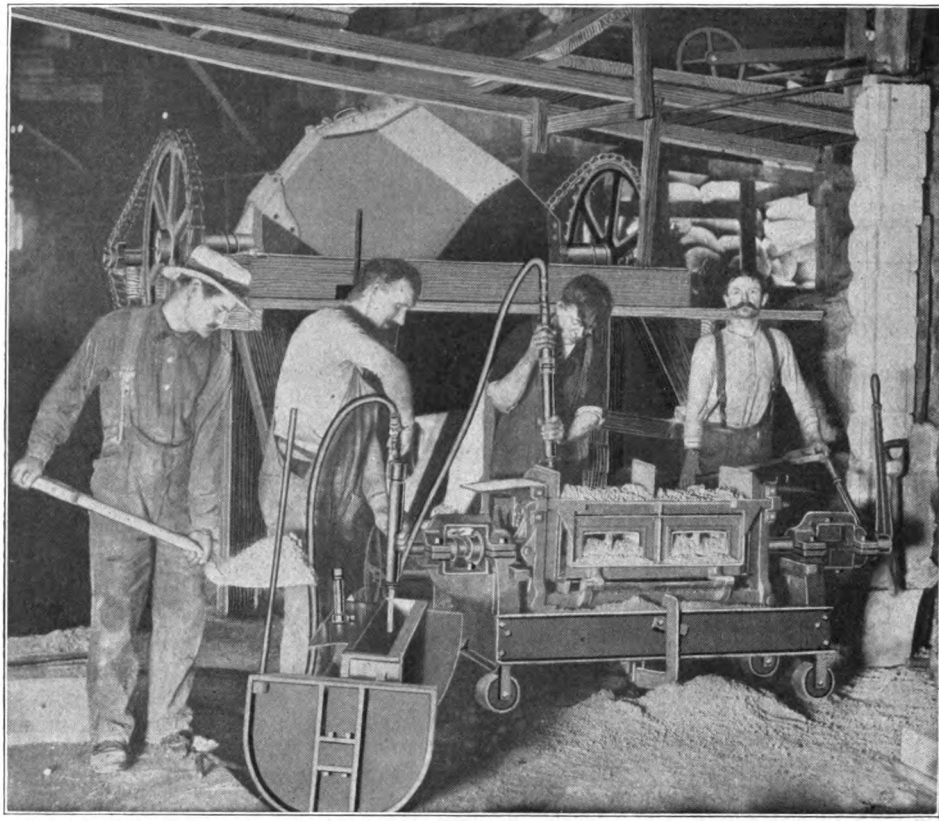
We have arranged to present to our readers a series of articles covering this subject, trusting to awaken the proper interest therein. The knowledge of these abuses should certainly receive consideration and ways and means devised for correcting them as far as possible. The adaptability of these tools to a much wider range of work than embraced at this time is certainly possible, and it is to be regretted that imaginative minds have practically become content with present conditions. The value of tools of this character cannot be over-estimated, and the time will come when the library of Economics will not be complete without an exhaustive treatise on the adaptability of these tools to general shop practice, and the phenomenal saving effected thereby. One of the largest steel mills in the world having made an exhaustive test of the saving effected by the use of the small chipping hammer to their work, are frank to admit these tools would be cheap at one thousand dollars each for the work they are performing, and this applies more or less to their range of work as a whole. There are many points to be considered in connection therewith. Time in accomplishing a given piece of work may be the greatest factor in some cases, regardless of cost, but few are the instances where there is not a decided improvement in the productive costs, if time is only a secondary consideration.

Mr. J. W. Duntley, president of the Chicago Pneumatic Tool Company, returned on the 5th instant from Europe, where he has spent the past six weeks in the interest of the company. He brought back with him orders for 3,400 tools for shipment from America, representing a value of over $300,000.

Mr. Duntley states that the trip was the most successful he has ever experienced, and owing to the growing demand for pneumatic tools in England and on the continent, it was found necessary to extend the organization of the foreign business. In order to accomplish this the factory and business of E. G. Eckstein, Berlin, Germany, and that of the Lencke Company, St. Petersburg, Russia, were purchased and will be operated for the purpose of meeting these requirements in the continental countries. Pneumatic tools are rapidly being introduced in ship building and other industries in Russia, Austria, Germany, Italy, France, etc., and a large increased demand for the various devices is anticipated. The line of electric drills exhibited and demonstrated was extremely successful and large orders were received therefor. Owing to the fact that all European countries are well equipped with electricity, the electric drill is destined to rival the air drill in time and opens up a field which heretofore could not be solicited. The profits earned through the extension of the foreign business will accrue to the benefit of the Chicago company.

The English courts on May 17 rendered the final adjudication of the patent litigation instituted by the English company, which decision sustained all of the company's claims, fifty-two in number, covering pneumatic hammers, thus leaving the English company in a particularly strong position with reference to its patents. Its plant, located at Fraserburgh, Scotland, is now in full operation.

The American business, according to President Duntley, shows a very satisfactory increase in volume and all factories are operating overtime.



The Hotchkiss Concrete Stone Company, Chicago, manufacturing concrete blocks with the aid of Sand Rammers.

THE SAND RAMMER APPLIED TO THE MANUFACTURE OF CONCRETE BUILDING BLOCKS.

The manufacturers of Pneumatic Sand Rammers have long since advocated their adoption in the manufacture of the concrete building block, believing from their very successful application to foundry work that their field of usefulness was not limited to the foundry alone, and recent events have proven this to be correct. Ever since the concrete building block became a commercial success, it has been evident that some other method should be adapted for properly packing the mould than by screw or by steam pressure, for the reason the more compact the material in the mould the better the grade of blocks. To use hydraulic pressure meant the strengthening of the moulds and the installation of expensive machinery, whereas the conditions did not seem to warrant this method, and although the sand rammer has been advocated, the concrete block manufacturers have hesitated adopting them. However, at last a firm was located who were progressive and ready and willing to try anything that would improve the grade of material they were turning out and at the same time effect a saving in their factory costs, and we present herewith a photograph taken in the factory of the Hotchkiss Concrete Stone Company, 100 Washington street, Chicago, showing the sand rammer in actual operation. We are indebted to this progressive firm for directing the attention of IDEAL POWER to the use of the sand rammer in this work, and we wish them every possible success. The arrangement has proven extremely successful, has enabled them to manufacture a higher grade of building block than here-

tofore possible under original methods and at economical cost, therefore it is safe to predict a very bright future for their business. Their business is on a well established foundation and they have nothing to fear from competition, and in view of this fact they have not hesitated to make known to the public the means of their success. Wherever compressed air and pneumatic tools and appliances can be adapted to any class of work it has been almost universally the means of a business success which might otherwise have eventually proven a failure, as pneumatic tools and prosperity go hand in hand. It is to be expected that other progressive firms will fall in line and in the near future the sand rammer will be seen in all plants where the building blocks are manufactured. The improvement effected in the grade of the material will also have a tendency to broaden the field of their usefulness. The sand rammer being used by the Hotchkiss Company is of the well known Boyer type, manufactured by the Chicago Pneumatic Tool Company.

THE CARE OF PNEUMATIC TOOLS.

The following extract is taken from an article in The Engineering Magazine on "Systematization and Tool-Room Practice in Railway Repair Shops," by Mr. R. Emerson:

"Railroads use tools of all kinds; it is difficult to say whether the investment in small tools or in machine tools is greater. While the former are individually cheaper, they may be collectively more costly. One of the most important features of small-tool equipment is the air-tool service. These tools, for the money invested in them, do giant's work, but on account of the severe strains to which they are put they suffer frequent disorders. Unless this branch of the service is rigorously supervised constant trouble and vexatious delays will result. From figures in my possession I find that the maintenance and repair charges on pneumatic tools range from 60 per cent to 90 per cent per annum on the purchase price of these tools, without counting the depreciation and interest charges, which, in the case of tools with life is so short as these are very high—I should say, combined, an additional 100 per cent. In fact, this maintenance and repair cost, together with the purchase price of the tool, will average somewhat above $200 per annum, this figure applying equally to motors and hammers. As it is false economy to do work by hand that can be done by air, and as there is much work that can be done more conveniently and cheaply with portable air tools than with stationary machine tools, the larger the number of air tools engaged in productive work the cheaper the output cost.

One large railroad company had its pneumatic tool account rising steadily for the past five years, averaging over $15,000 per year for new tools and material and labor repair charges alone. This account had not been systematically looked after, tools being battered around the shop till it was no longer possible to effect simple repairs and adjustments, when they were sent to the manufacturers for thorough overhauling and replacement of parts. The practice obtained of men seizing what motors they could lay hands on and using them, often carelessly, until the machines would no longer give good service or run at all. There was practically no one to raise the question except the man using the machine or the shop foreman who was interested in the output of the work, or the tool-maker who was delegated to make repairs—each of these men being powerless to effect any reform or establish any system of properly handling these tools as a general proposition. But when the master mechanic himself awoke to the importance of this matter—because, on the one hand, of the curtailment of his requisitions for additional air-tool equipment, and because, on the other hand, of a long-drawn howl on the part of the shops for increased facilities in this direction he set a special apprentice to work to see what could be done and saved by means of an efficient system. The net result of a system of holding men and foremen responsible for machines definitely assigned to their charge, together with the enthusiastic co-operation and ingenious handling of the repair question by

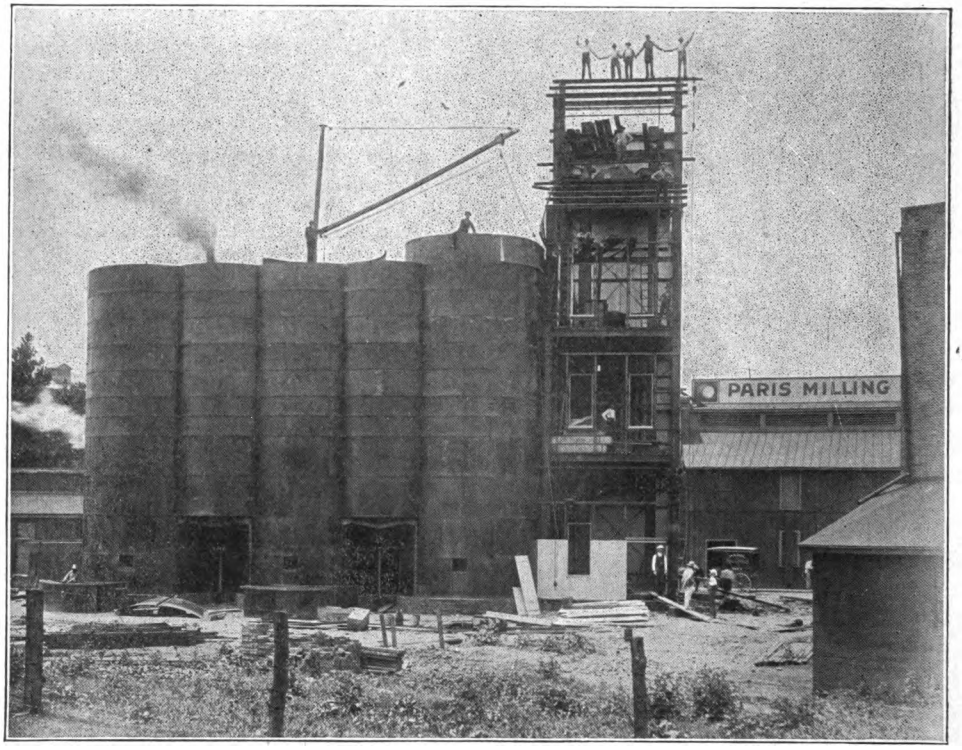


Fig. 1. Grain Tanks under process of erection at Paris, Ky., by The Chas. Hegewald Co., New Albany, Ind., on which Boyer hammers were used.

the tool-room foreman, was a reduction in cost to less than $5,000 per year, not counting interest, depreciation and fixed charges. This saving represents the interest at 4 per cent on $250,000. These figures take no account of the saving of the men's time due to increased use of air-tool equipment and more efficient performance of same in service, as these savings, being indirect, though great, could not be determined."

From the foregoing it will be clearly seen, through the saving of time in completing a given piece of work, to say nothing of the improvement in the class of work pneumatic tools are invaluable in shop practice wherein they are adaptable. However, we are inclined to believe the maintenance cost as given by Mr. Emerson will have a tendency to discourage new purchasers of pneumatic equipment. The figures furnished by Mr. Emerson are presumably based upon a moderate equipment, say, approximately, forty tools. Either a small or large installation are the most economical in maintenance cost. The small installation does not require a special attendant, but can be looked after by the regular mechanical force, reducing the labor charge to a minimum. With an equipment consisting of forty tools it should be put in charge of a special machinist whose duty it is to follow the equipment closely, to keep it in good repair; therefore to start with there will be a labor charge approximately 33 per cent, and an additional charge of 7 per cent for repair parts, or a total maintenance cost of 40 per cent, without taking into consideration interest on investments and depreciation. It has been clearly proven, one man can care for one hundred tools where the proper attention is given them by the workman handling them, hence the labor charge only approximates 13 per cent. One of the largest manufacturers of pneumatic tools for years kept an accurate account of

repairs and renewals and found it only represented 5 per cent, and we have had our attention directed recently to tools in service which have been working regularly for a period of seven years. These tools, of course, have been well cared for, and the workmen using them appreciate their value in aiding them in their labors, and handle them as they should be handled.

A pneumatic installation will invariably prove a valuable asset, and add largely to the earning power of any company.

Modern labor saving machines are sometimes blamed for lowering the standard of skilled workmen by transforming him into a mere automaton, a droning machine tender. Undoubtedly in some crafts there is less call for men of manual dexerity than there was before the invention of labor-saving devices, leading to a decreased demand for all-around mechanics, and an increased demand for men of only sufficient intelligence to guide an almost sentient machine. On the other hand, many types of labor-saving devices have counteracted this tendency by offering mechanical means for doing the drudgery of a shop, making necessary a higher average of intelligence than before. Pneumatic drills and hammers, portable electric drills and hydraulic riveters are in this class, as skill and judgment rather than mere brute strength and endurance are called for in their operation.

Pneumatic tools are outrageously abused in many cases; sometimes without the knowledge of the management and at other times with their sanction, the latter being the occasion of these tools having such large earning power they are considered an economical investment even though their life be but three months. This latter remark may seem an exaggeration; however, it is borne out by actual knowledge. One of the largest steel concerns in the world is using chipping hammers where nine

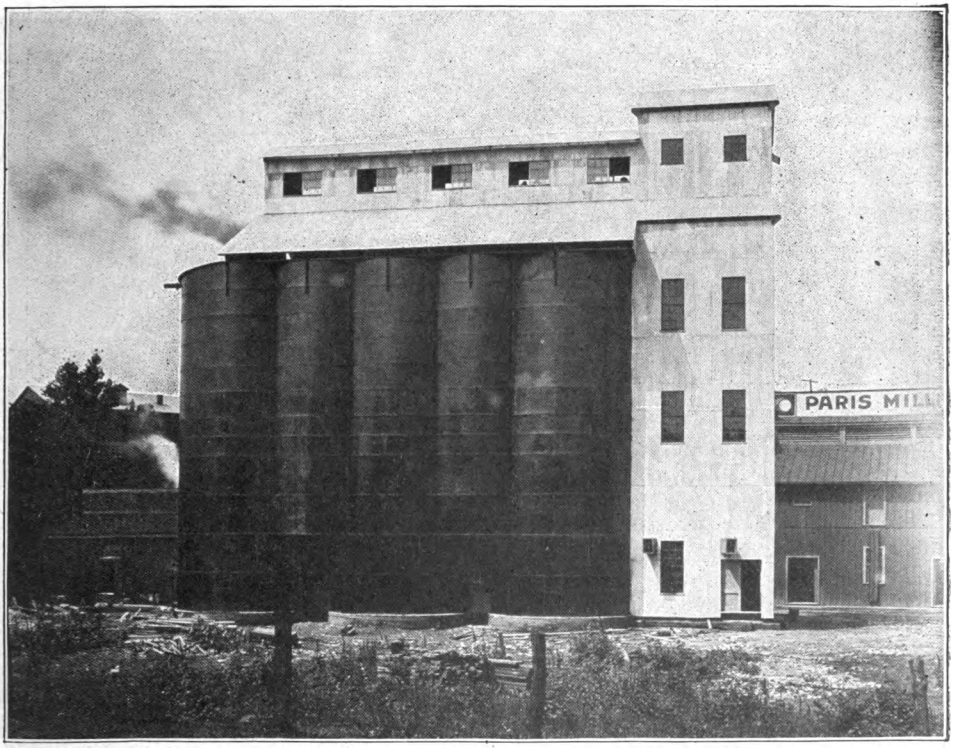


Fig. 2. Completed Grain Tanks.

hammers in the hands of men skilled in their manipulation perform easily the work formerly requiring ninety unskilled men with mauls and cutters. Under old methods the yard was continuously blocked, while with the aid of the chipping hammer, nine men keep the yard clean. The superintendent has stated if these hammers could not be purchased for less he would consider them an economical investment at one thousand dollars each for the work in mind, that of chipping flaws from billets, ingots, slabs, etc. The tools in this case are appreciated by both the management and the workmen and are well cared for. For chipping and drifting holes in car couplers, which is the severest test to which the riveting hammer has yet been subjected, their life is from four to six months. Even with life so short, those having adopted them for this service state the saving in wages and increased output make them an extremely economical investment.

There are many abuses practiced which it is hard to locate; one of the most flagrant being the use of short pistons in the riveting hammers. The manufacturers, after careful experiments, have decided on a piston of proper length to perform satisfactorily the work for which the tool was designed and all parts are made in proportion to withstand the strain.

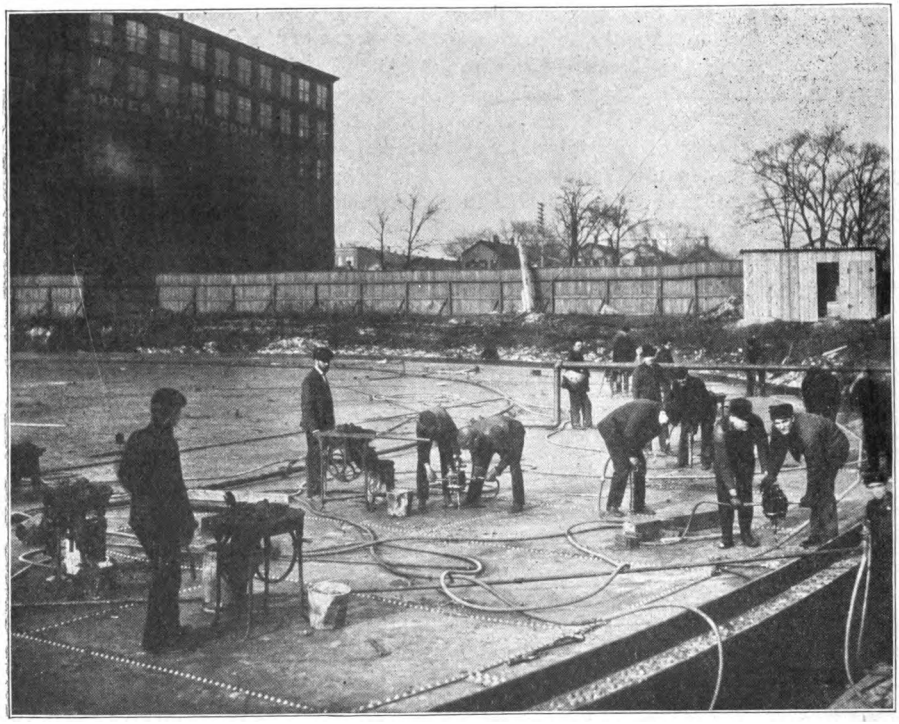


Fig. 3. Pneumatic Tools and Appliances being used on Gas Tank work, Chicago, by the Bartlett & Hayward Co., Baltimore, Md.

Workmen anxious to perform their day's task in the shortest possible time, or increase their volume of work where they work on a per piece basis, have little or no regard for these labor saving devices. Having discovered a piston a fraction of an inch short will do the work more rapidiy, they resort to all manner of means to secure them, even having them made in

outside machine shops. They carry them in their pockets, and as soon as they take the hammer from the tool-room they substitute the short piston for the one of proper length, again making the exchange before turning the tool into the tool-room —the result is, sets and handles are broken and cylinders split frequently. Where these breakages are occurring at short intervals it would be well to detail the amount of work being accomplished by different tools, and the more careless workmen located and disciplined. Where this practice is followed, many times when the output of the shop is being forced to such an extent as to require all tools in service, and a workman is delayed in completing his work while the men who are more careful of their tools finish in good time, it has a tendency to cause others to exer-

Fig. 4. Boyer Hammers on South Side Elevated Work, Chicago. Erecting Contractors, Kelley-Adkinson Construction Co., Chicago.

some one to go through the shop and examine the pistons while the hammers are in use, otherwise the cause for the breakages will not be definitely located.

Some of the large car plants have adopted the practice of issuing a given tool to the same workman continuously, and this has had a tendency to cause better care to be taken of the tools. If break-downs occur frequently it enables them to compare cise greater care, which accrues to the benefit of all parties interested, even back to the manufacturers.

(To be Continued.)

PNEUMATIC TOOLS ON FIELD WORK.

We are pleased to be able to present to our readers this month a number of views of large structural work, accomplished through the use of pneumatic tools. The

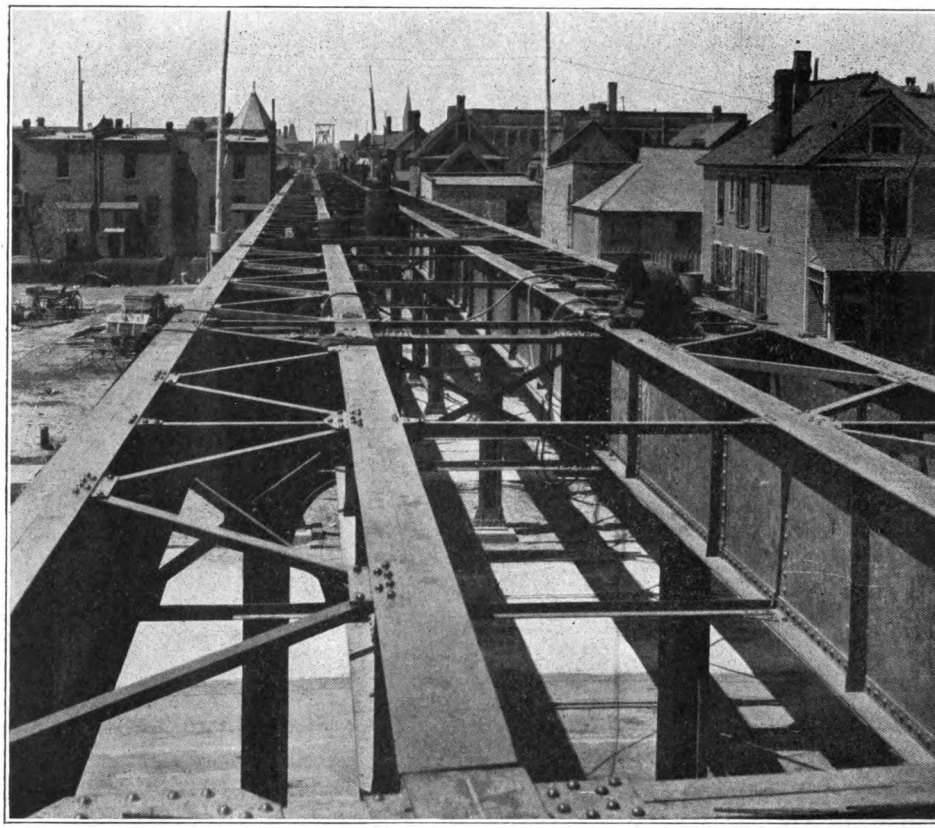


Fig. 5. South Side Elevated, Chicago.

variety and magnitude of this field work, and the comparative ease with which it is done, seems hardly possible to those not familiar with this phase of pneumatic application.

Fig. 1 shows six grain tanks in process of erection, and Fig. 2 the completed tanks as built at Paris, Ky., by Chas. Hegewald Company, of New Albany, Ind. These tanks are each 18 feet in diameter and 45 feet high, with center partitions and overhanging tanks. They are hopper bottomed and covered with a roof of corrugated iron. A structural steel building is attached to one end of the series of tanks. All of the rivets, most of which were half-inch diameter, were driven cold under an air pressure of 110 pounds. There were 40,000 rivets in all, driven with three Boyer Riveting Hammers. After the completion of this work the hammers were found to be in excellent shape, and were returned to the shops of Hegewald Company without repairs, for use there.

One of the largest gas receivers ever constructed is now rapidly nearing completion for the People's Gas, Light & Coke Company, at the corner of Hawthorne and Clay streets, Chicago. This work is being carried on by the Bartlett & Hayward Company, of Baltimore, Md., under the supervision of Mr. E. Borst, erecting superintendent.

The lower section of this tank is 198 feet in diameter, by 40 feet high, and is provided with a bottom which rests on a concrete foundation. This section is to contain water to form the water seal. Fig. 3 shows the bottom of this section in the early stages of construction.

The gas holding part of the receiver consists of five telescopic sections, the larger one being three feet less in diameter than the lower section, and each of the other four sections three feet less in diameter than the adjacent section just outside of it. The inner or smallest section is provided with a top. Each of these sections is 40 feet high, so that when the receiver is full of gas its total height will be 240 feet. The lower edges of the telescopic sections are each provided with an iron trough about 12 inches deep, and the upper edges are provided with an inverted trough which interlocks with the lower trough in the next smaller section, thus forming a water seal for the telescopic joints. The troughs on the lower edges, of course, fill with water from the lower section, into which they dip when the gas is low in the receiver. The total gas capacity of this tank is 5,000,000 cubic feet.

All the material used in the construction of this receiver is being handled by means of air hoists, or winches, driven by air motors. There are a total of 1,000,000 rivets of from five-eighths inch to one and a half-inch diameter to be driven, which work is being done with ten compression riveters of 42-inch reach and 8-inch gap, and fourteen Boyer Riveting Hammers used in connection with pneumatic holders-on. Four Little Giant Air Drills and six Boyer Clipping Hammers are being used in fitting and trimming up the plates. All tools being driven by compressed air furnished by a Franklin Air Compressor.

Another more common, but none the less interesting piece of work is that shown in Figs. 4 and 5, which are views of the new elevated railroad structure connecting with that of the South Side Elevated Railroad at Forty-first street, Chicago. The rapid and efficient manner in which this work is being accomplished can be accounted for only by the fact that pneumatic tools are being used wherever possible, consisting of the Boyer Hammers and Little Giant Drills.

The National Motor Vehicle Company, of Indianapolis, are distributing a booklet descriptive of their latest models in automobiles, the "Round Radiator Cars."

HOW TO DISTINGUISH STEEL FROM IRON PIPE.

The following bit of useful information is taken from the Valve World for April, the fourth issue of the new monthly publication of the Crane Company, Chicago, Ill:

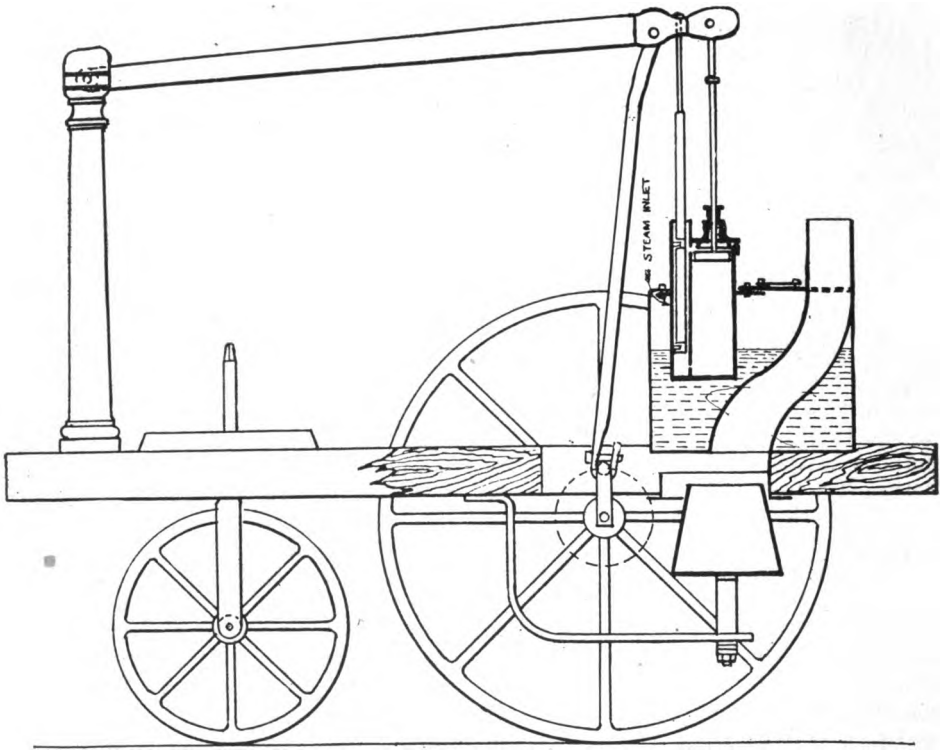
Iron pipe is rough in appearance and the scale on it is heavy, whereas the scale on steel pipe is very light and has the appearance of small blisters or bubbles, underneath which the surface is smooth and somewhat white. Steel pipe seldom breaks when flattened, but if a fracture does occur it will be noticed that the grain is very fine. Iron pipe when subjected to this test breaks easily, and shows a coarse fracture, due to the long fiber of the material.

The impression prevails with many that steel pipe is exceedingly hard, for which reason they imagine that it is threaded with diffculty and that the threads are easily broken off. This is erroneous, the truth being that steel pipe is soft and tough. The threads of this pipe do not break, but they tear off, to avoid which it is necessary that the cutting die shall be sharp so as to cut above the center. Dies suitable for steel pipe can also be used on iron pipe, but blunt dies that will work successfully on iron pipe will tear the threads on steel pipe, owing to the softness of the metal.

A Faux Pas.

"By ginger!" said Farmer Foddershucks, "I know I'm a Reuben, but I'll be durned ef I'm ez awk'ward ez Henry's folks make me out ter be. Went ter supper at his fine house when I was to th' city tother day. When I come ter set down, blamed ef ther' wasn't six forks at my place! S'pose they figgered I'd drop at least that many on th' floor, an' they 'lowed ter keep me s'plied with clean ones. Henry's folks is pretty high and mighty fer style, but that there's nothin' less than onpolite!"

Mines and Minerals, May issue, is devoted exclusively to compressed air, and those who are particularly interested in this subject should procure a copy of this compressed air number.



William Murdock's Locomotive, 1784.

WILLIAM MURDOCK'S LOCOMOTIVE, 1784.

This cut shows a longitudinal section of a miniature locomotive, made by William Murdock in 1784.

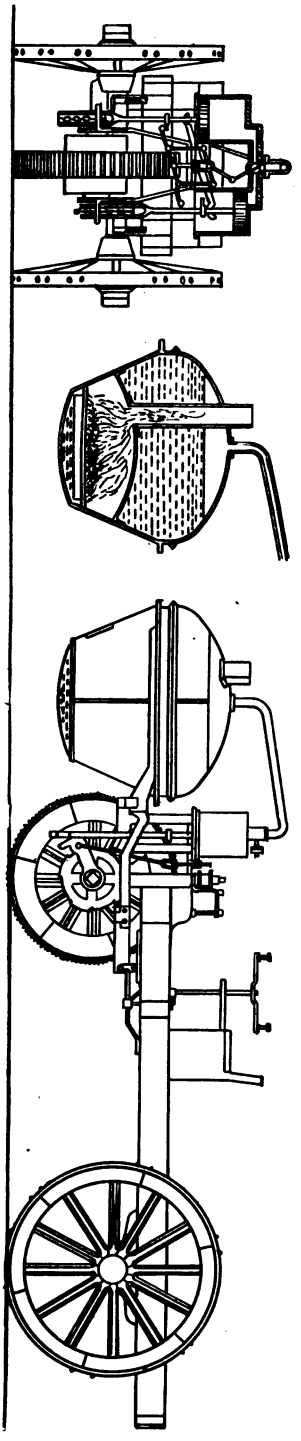
It had a single vertical cylinder, ¾-inch diameter, by 2-inch stroke, the slide valve was actuated by a tappet motion, the beam striking it up and down, alternately at each end of the stroke, the piston rod was connected to one end of a beam vibrating upon a joint at the other, as in the class of engines now known as "grasshoppers." A connecting rod was joined to the beam close to its working end, and turned a crank in the axle of a pair of driving wheels 9½ feet in diameter. The cylinder was half immersed in a small copper boiler, through which a flue passed obliquely, the heat being supplied by a spirit lamp beneath.

This machine is still in existence, and is the property of Mr. Murdock, manager of the Sun Foundry, Leeds, and grandson of William Murdock.

CUGNOT'S LOCOMOTIVE 1771.

One of the earliest attempts in the way of steam locomotion was the engine of Nicholas Joseph Cugnot of France; designed to run on common roads. His first carriage was put in motion by the impulsion of two single acting cylinders, the pistons of which acted alternately on the single front wheels. It traveled about three or four miles an hour and carried four persons, but, from the smallness of the boiler, it would not continue to work more than twelve or fifteen minutes without stopping to get up steam. Cugnot's Locomotive presented a simple and ingenious form of a high pressure engine, and though of rude construction was a creditable piece of work considering the time. He made a second engine, with which several successful trials were made in the streets of Paris, which excited much interest. An accident, however, put an end to the experiments. Turning the corner of the street one day near the Madeline, when the machine was running about three miles an hour, it upset with a crash, and, being considered dangerous, was locked up in the Arsenal.

Cugnot's Locomotive is still to be seen in the Museum of the Conservatoire des Arts' et Metiers, at Paris.



Cugnot's Locomotive, 1771.

1—Driving wheel, 50″ dia., 7″ wide at tire. 2—13″ Single acting cylinders. Speed, 2¼ miles per hour, carrying 4 persons. Actual horse power, 5. Weight in working order, 12 tons.

HARDENING COPPER.

According to the report of U. S. Consul W. R. Holloway at Halifax, N. S., the men who have been experimenting with hardening copper are meeting with success. In the April issue of the Railway Journal a brief note was made of their progress in this direction. Since then Mr. Holloway writes as follows: "Referring to my former report, printed in Daily Consular Reports for March 11, 1905, No. 2203, wherein I stated that two well-known Chester (Nova Scotia) men, A. M. Church and Mr. Cleveland, the latter a blacksmith, were satisfied they had succeeded in hardening copper, and that E. B. Church had received a piece of metal treated by the process, which appeared to be very hard, I have to report that since then he has received a razor made of their hardened copper, with which one can shave. Having been made in a blacksmith shop, the razor is necessarily crude, but the blade is hard and carries a sufficiently sharp edge to remove superfluous hair. The elder Mr. Church writes that by the process the metal can be hardened to any degree. A United States firm has written regarding the discovery. Mr. Cleveland is expected in Halifax in a day or two to make further experiments with more suitable facilities and apparatus than are available at Chester."

Dead Game.

At a dinner one day, some men were discussing the merits of different species of game as articles of food. "'Well, Frank, said one of the men during a lull in the conversation, turning to the waiter at his elbow, "what kind of game do you like best?"

"Well, Massa, to tell you the trufe, almost any kind of game'll suit me, but what I like best is an American eagle served on a silver dollar."—Life.

Superseded.

Foreigner—The eagle is your national bird, isn't it?

Native—Oh, that was some time ago. Now it's the stork.—Life.

THE NEW TYPE OF FRANKLIN COMPRESSOR.

We illustrate on opposite page a new type of Compressor, recently installed at the American Brake Shoe & Foundry Company's Works at Chicago Heights, Ill.

This Compressor is the Chicago Pneumatic Tool Company's new pattern G type and is designed to supply a blast of 2,500 cubic feet of free air capacity against a pressure not exceeding 5 pounds per square inch when running at a speed of 150 r. p. m. with 80 to 100 pounds steam pressure.

The same machine is also employed at intervals to deliver a pressure of 40 pounds per square inch for sand blast operation.

The Compressor has steam cylinders 12 inches in diameter by 16-inch stroke, air cylinders 24 inches in diameter, by 16-inch stroke, and is equipped with automatic inlet and discharge valves located radially in the air cylinders.

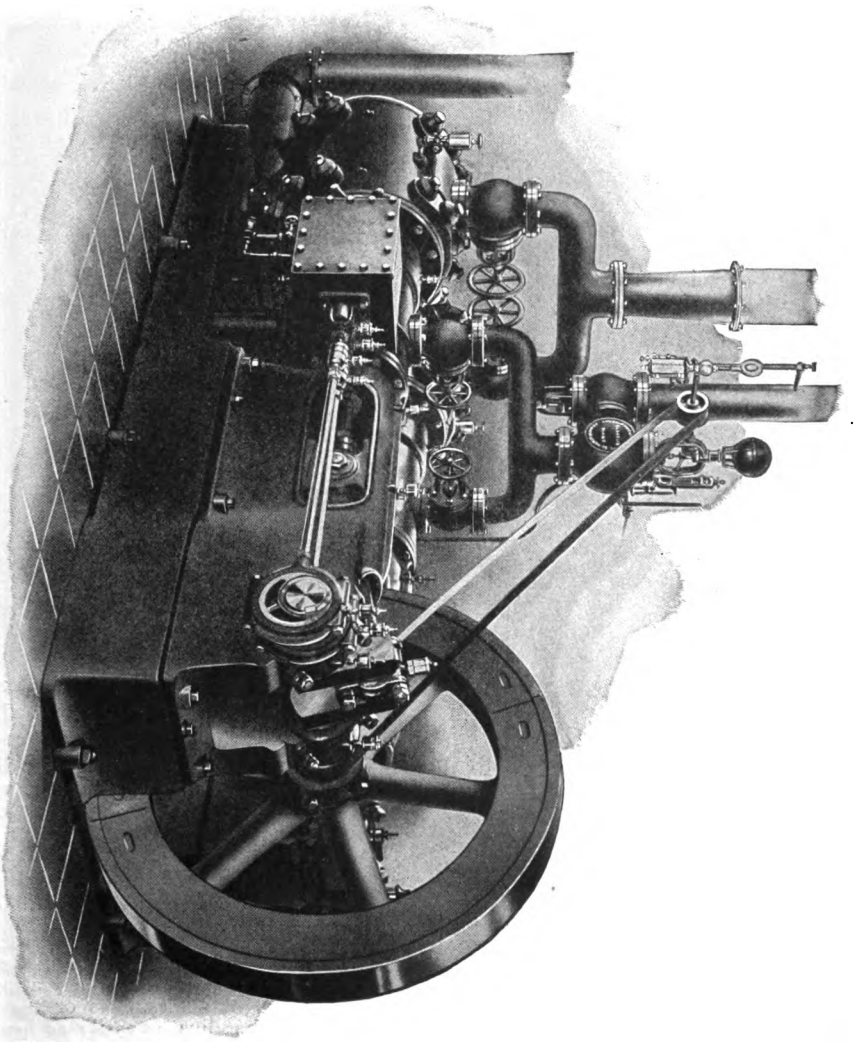
This type of machine is also built with mechanically actuated inlet valves of the semi-rotary type when preferred.

Of especial comment is the compactness and symmetry of the design, the accessibility of all parts and the perfect provision for automatic regulation.

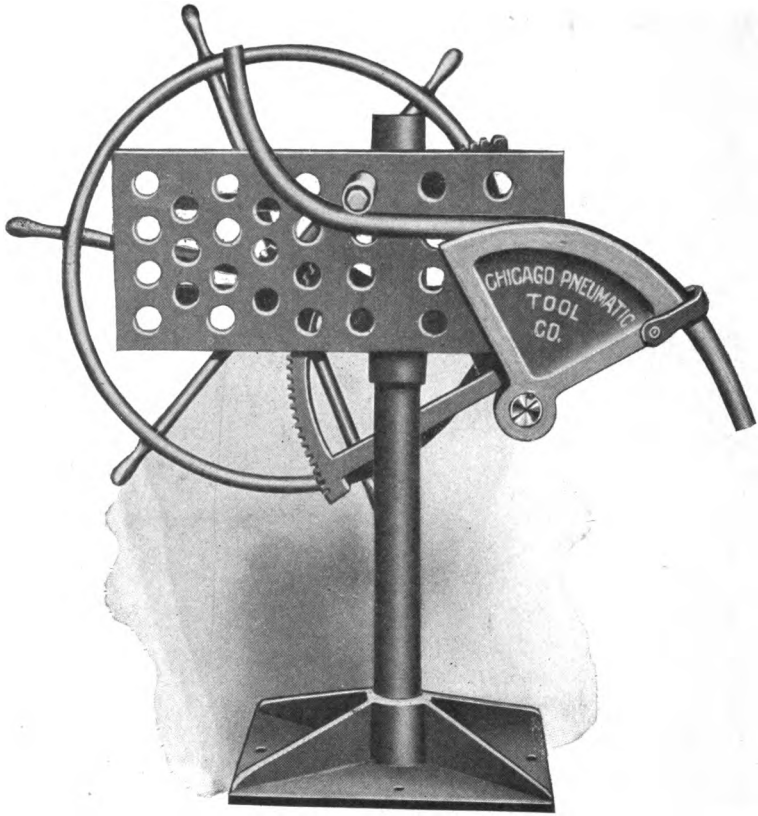
Compressors of this type find a wide range of usefulness in light pressure blast work of all description, operating oil burners, agitating liquids and for all employments of compressed air or gases under moderate pressures.

This type of machine is built in many different capacities and sizes, full information pertaining to which is available to interested inquirers.

The fifth annual convention of the National Electrical Contractors' Association of the United States and the Electrical Contractors' Association of Massachusetts will be held in the city of Boston, July 15 to 22. inclusive, in connection with which there will be an electrical exhibition. Space has been reserved for all journals who anticipate having a representative attend. IDEAL POWER has been especially requested to have a representative on hand. We must be appreciated by the fraternity when we get into the Bostonian Society so early in the game.



Franklin new-type G-D. S. Compressor, installed at American Brake Shoe & Foundry Company Works, Chicago Heights, Ill.



Chicago Pipe Bending Machine.

A NEW PIPE-BENDING MACHINE.

This machine, while being of a somewhat simple character, will accomplish a great variety of work in line of its intended duty. It requires the services of an ordinary helper only, who can, with the aid of this machine, bend pipe to any desired complex curvature in a very short time. The machine is operated by a hand-wheel which carries a pinion. The latter engaging a quadrant-gear operates the bending quadrant. One end of the pipe which is to be bent is held in position by a U-shaped clip, while a pin or roller in the platen engages the other end. The placing of the pin or roller in the different holes governs the curvature obtained.

Being light in weight, it is readily carried from shop to job, or vice-versa, and can be secured to any column, stanchion or any available support in a few minutes, or a suitable stand can be furnished, as shown. Piping of steel, iron, brass, copper or other materials up to 2 inches in diameter can be bent cold. It has a great value in shipyards, pipe-shops, locomotive works, sugar houses, and other places where pipe is used to any extent. Makers of heating plants, structural and architectural iron the earning power of any company, as workers, fire-escape manufacturers, will find this portable pipe bender especially useful. It is also well-adapted for the use of special dies that can be readily attached for bending light angles, flats or tee bars to any desired radius as easily as bending pipe. One man can, without assistance, bend a piece of 2-inch pipe to an S-bend in three minutes. The cost of repairs, where it has been used ten hours per day in shipyards, railroad shops and other places, has been so slight in nature as to be a negligible quantity. The machine is being manufactured and sold by The Chicago Pneumatic Tool Company.

Aim high.

Be good, but not easy.

Many hands want light work.

It's a wise investment that knows its own par.

Men are ever forsaking fortune when she is about to smile.

Some men never make a mistake because they never make a move.

Because God helps those who help themselves don't make a hog of yourself.

If you train servants in the way they should go, the first thing you know they are gone.

You cannot expect the world to have a good opinion of you unless you set the example.

If all would work a little none would be overworked.

It takes less than two half-truths to make a full-sized lie.

People who advertise their troubles never clear off their stock.

The difficulties that dishearten the small man only determine the great.

He isn't very much in love if he writes sensible letters to his best girl.

Take sunny views of things. "A merry heart doeth good like a medicine."

Many a man's reputation would not know his character if they met on the street.

A man is seldom able to see a job when he looks through the bottom of a beer glass.

A good many of the difficulties we complain of are difficulties only because we complain.

Seeing the worst of it is not the worst that can happen.

The strawberry box bottom comes high, but we must have it.

Some men have their wishbone where their backbone ought to be.

Many a good name has been given the tar and feather degree by idle gossip.

—Technical World.

'Appy Eppy Grams.

Riches may haf vings, but they nefer flew my way.

Der girl dot hesitates is left at der hitching post.

Der viskey of to-day is der headache of to-morrow.

History is der place vare great men go to be forgotten.

It is a long lane that has no automobustup on it dese days.

Birds of big fedders flock togedder on der theater hats.

An ounce of prevention is vort 250 pounds of policeman.

If marriage is a lottery vy don't they arrest der minister.

Viskey is der banana peel vich slides a man's soul from under him.

Fools rush in on a pass vile vise men haf to buy at der box office.

Some young mens start ouid to play der prodigal son and come home playing der fathead calf.

Some vimmen chump at conclusion der same vay dey chump off a street car, vich is backvard.

Reform is a vord vich der politicians borrow until after election, den dey put it back in der dictionary.

Der vorld owes efery man a lifing, bud you vill find it a poor boarding house at supper time if you doan'd hustle.

—Dinkelspiel, per Geo. Hobart.

Los Angeles, Cal. May 8th, 1905.

Chicago Pneumatic Tool Co.,
Fisher Bldg., Chicago, Ill.

Gentlemen:

Your representative, Mr. H. L. Miller, has recently demonstrated your 25 pound Chicago Rock Drill to the entire satisfaction of a large party of Arizona and Sonora mining men, including Mr. Wm. Richardson, Supt. & Gen. Mgr. of Bufa Mining, Milling & Smelting Co., Mr. Lane, heavy stockholder, and director of above Company, Mr. O. B. Steen, a noted mine owner, and Mr. David Llewellyn, Gen. Mgr. the Llewellyn Iron Works, and many others of equal importance.

The test was made in a granite boulder of the very hardest formation, resulting in drilling at the rate of 30 inches in 8 min. 40 sec.

I have seen many small drills and dare say that this type of drill will revolutionize the expense of mining.

Our party was very much interested in your Boyer Hammers and Little Giant Drills in use throughout the Llewellyn Iron Works, one riveting hammer having been in use for the past six years and still giving satisfactory results.

I enclose subscription for "IDEAL POWER;" kindly send same to my Los Angeles address.

Yours very respectfully,

Marshall P. Wright

IDEAL POWER

A MONTHLY MAGAZINE
DEVOTED TO COMPRESSED AIR AND ELECTRICAL APPLIANCES

Vol. 2 JULY, 1905 No. 4

Subscription Price, 10c. Foreign Countries, 25c.

CONVENTION DATES.

American Boiler Manufacturers' Association, Toronto, Canada, July 25, 26 and 27, 1905.

National Association of Stationary Engineers', Louisville, Ky., August 1 to 5, 1905.

National Railroad Master Blacksmiths' Association, Cleveland, Ohio, August 15, 1905.

August 16—National Convention of Railroad Commissioners, at Deadwood, S. D.

Road Master and Maintenance of Way Association, Niagara Falls, N. Y., September, 12th, 1905.

American Association of Traveling Passenger Agents, Portland, Oregon, September, 1905.

Traveling Engineers' Association, Detroit, Mich., September 12th, 1905.

Master Car & Locomotive Painters' Association of the U. S. and Canada, Cleveland, Ohio, September 12 to 15, 1905.

International Union of Steam Engineers', Toronto, Canada, September 11 to 16, 1905.

American Association of Railway Surgeons, Chicago, October, 1905.

Canadian Road Masters' Association, Toronto Jct., Ontario, October, 1905.

American Association of General Passenger and Ticket Agents, City of Mexico, Oct. 17, 1905.

Association of Railway Superintendents of Bridges and Buildings, Pittsburg, Pa., October 17 to 19, 1905.

Southern and Southwestern Railway Club, Atlanta, Ga., Nov. 21, 1905.

Association of Maintenance of Way Master Painters, (U. S. & Canada,) Cincinnati, Ohio, Nov., 21 and 22, 1905.

Engine Builders' Association, New York, December, 1905.

American Society of Mechanical Engineers' New York, Dec. 5 to 8, 1905.

Western Railroad Association, Chicago, January, 1906.

Engineering Societies.

American Railway Mechanical and Electrical Association, Sec., Walter Mown, 12 Woodward av., Detroit, Mich.

American Society of Heating and Ventilating Engineers' Sec., W. M. Mackay, P. O. Box 1818 New York City.

American Society of Mechanical Engineers —Pres. John R. Freeman, Providence, R. I.; Sec., F. R. Hutton, 12 W. 31st st., New York; permanent headquarters, 12 W. 31st st., New York.

American Society of Naval Engineers—Navy Dept., Washington, D. C.—Pres. A. F. Dixon, Commander, U. S. N.; Sec. and Treas., Chas. K. Mallory, Lieut. U. S. N.

American Boiler Manufacturers' Association Pres. R. Monroe, Jr., Pittsburg, Pa.; sec., J. D. Farasey, Cleveland, Ohio.

American Institute of Electrical Engineers —Sec., R. W. Pope, 95 Liberty st., New York.

American Order of Steam Engineers—Supr. Chief Engr., Hiram M. Trout, Reading, Pa.; Supr. Cor. Engr., C. Ling, 306 Lippencott Building, Philadelphia, Pa.

Association of Edison Illuminating Companies—Sec., W. H. Johnson, Philadelphia, Pa.

Canadian Electrical Association—Sec., C. H. Mortimer, Toronto, Ont., Can.

Canadian Association of Stationary Engineers—Pres., Chas. Moseley, Toronto; Sec., W. Inglis, 554 Bloor st. W., Toronto, Ont., Canada.

Engineers' Association of the South—Sec., R. L. Lund, Nashville, Tenn.

Engineers' Club of Philadelphia—Pres., Edgar Marburg; Sec., J. O. Clarke; house, 1122 Girard St.; regular meetings 1st and 3d Saturdays.

Engineers' Society of Western Pennsylvania—Pres., Jas. M. Camp; Sec., Charles Ridinger, Pittsburg. Meetings, third Tuesday of each month.

Engine Builders' Association of the U. S.—Pres., C. A. Gates; Sec., J. I. Lyle, 39 Courtland st., New York.

International Union of Steam Engineers—Sec., R. A. McKee, Masonic Temple, Peoria, Ill.

Master Steam Boiler-Makers' Association—Sec., Geo. M. Clark, 1377 North Maplewood av., Chicago, Ill.

National Electric Light Association—Pres., Chas. L. Edgar, Boston; Sec., Dudley Ferrand, Newark, N. J.

National Association of Stationary Engineers—Pres., C. F. Wilson, Milwaukee, Wis., Sec., F. W. Raven, 140 Dearborn st., Chicago, Ill.

Ontario Association of Stationary Engineers—Pres., F. W. Donaldson; Registrar, J. G. Bain, 113 Yorkville, Av., Toronto, Ont., Canada.

Universal Craftsmen Council of Engineers —Chief Engineer John H. Leathers, Rochester, N. Y.; Sec., Chas. E. Davey, Federal Building, Detroit, Mich.

Western Society of Engineers—Pres., H. W. Parkhurst; Sec., J. H. Warder, 1737 Monadnock Block, Chicago, Ill.

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The Chicago Pneumatic Tool Company announces that it has brought suits at New York against the Aurora Automatic Machine Company and the Scully Steel & Iron Company and also against the Independent Pneumatic Tool Company, for the infringement of the company's Little Giant Drill patent, No. 630,357, of August 18, 1899. The bill of complaint prays for an injunction and an accounting of profits and damages against all the companies. The pneumatic tools complained of are known as the "Thor," which are manufactured by the Aurora company and sold by the Scully company and the Independent company as selling agents. We are informed that preliminary injunctions are to be applied for promptly and that the present suits are to be followed by additional suits for infringement of other patents owned by the Chicago company.

In line with the policy adopted by the Chicago Pneumatic Tool Company for broadening and extending its business, the announcement is made that the said Chicago company has purchased the factory and business of the Canadian Pneumatic Tool Company with works located at Montreal, Canada. It is the intention to manufacture in the above factory a complete line of the well known Boyer and Keller tools and Little Giant drills that the Canadian trade may be properly and promptly served. This no doubt will be gratifying news to users of Chicago pneumatic tools in Canada, as notwithstanding the high duty they have been forced to pay, one will observe by going through the leading manufacturing and railroad shops, that a large number are already in use. However, this should place them in position to materially increase their sales in the above territory. By being able to procure a home product of the highest order and at a decreased net cost, it will be a further incentive for all concerns whose work is within the range of these labor saving devices, to install such an equipment.

THE BOSTON SHOW.

Governor and Mayor Will Address the Fifth Annual Convention of Electrical Contractors, in Connection with the International Exposition—Partial List of Exhibitors —Progam for the Week.

The executive committee of the Massachusetts Association of Electrical Contractors held an important meeting, June 22d, at which time reports were made showing that all details of the fifth annual convention of the National Association of Electrical Contractors have been perfected. The exposition will open in Mechanics' Building, Saturday evening, July 15th, with a fine musical program by Reeve's American Band, which will also give concerts throughout the week. A large and efficient reception committee will be at headquarters Saturday, Sunday and Monday and will meet the specials due from New York and the west Tuesday afternoon and evening.

The open session of the convention on Wednesday will be a notable event. Addresses of Welcome will be delivered by F. L. Barnes, president of the Massachusetts state association; by Gov. Douglas in behalf of the state, and Mayor Collins in behalf of the city. E. McCleary of Detroit, Mich., president of the National Association, will then deliver the annual address, after which will come addresses and topics as follows: "The Electric Contractors' Association," by Charles L. Idelitz of

New York, ex-president of the National Contractors' Association and ex-president of the Building Trades Association of New York; "The Jobbers," by A. L. Gorman of New York, general manager of the Manhattan Electrical Supply Co.; "The Manufacturers," (speaker to be announced); "The Underwriters," by F. E. Cabot of Boston; "The Relations of Inspector and Contractor," by P. J. Kennedy of Boston, Commission of Wires. There will also be other prepared addresses and general discussion.

An executive session of the National Association will be held Wednesday afternoon, and the annual dinner to the members of the National Association will be given in the evening. Thursday forenoon will be devoted to a session of the association and at 2:30 p. m. delegates and guests will embark at Rowes Wharf for an extended steamer trip down the bay, dining at the Rockland House, Nantasket, and visiting Paragon Park in the evening. Friday will be devoted to executive sessions of the National Association and Saturday will be given to sight-seeing and entertainment.

A ladies' committee of thirty has been appointed to have charge of the lady guests' entertainment. Concord, Lexington, Bunker Hill, Harvard College and other historic and interesting places will be visited and an extended auto trip will be taken along the picturesque North Shore. Side trips for sight-seeing and shopping will be made daily. Delegates have already been reported from thirty-nine states.

Some of the Exhibitors.

Following is a partial list of those exhibitors who have secured space:

American Electric Novelty Mfg. Co., New York.
American Circular Loom Co., Chelsea, Mass.
American Electric Contractor Co., New York.
American Electric Sign Co., Boston, Mass.
American Electrician, New York City.
Automatic Electric Train and Station Annunciator Co., Lexington, Mass.
Appleton Electric Co., Bridgeport, Conn.
Booth & Co., Boston, Mass.
Bryant Electric Co., Bridgeport, Conn.
Benajmin Electric Co., New York.
Bova, L. E., Boston, Mass.
Chicago Pneumatic Tool Co., Chicago.
Couch, S. H. Co., Boston, Mass.
Couch & Seeley Co., Boston, Mass.
Cotton, Chas. A., Boston, Mass.
Chase-Shawmut Co., Boston, Mass.
Condit, S. B., Jr., Electrical Co., Boston, Mass.
Daily Mail, Lowell, Mass.
Dale Company, New York.
De Veau Telephone Co., New York.
Dossert & Co., New York.
Delaware Hard Fibre Co., Wilmington, Del.
Dorn, Philip, Boston, Mass.
Electric Gas Light Co., Boston, Mass.
Economical Electric Lamp Co., New York.
Eastern Carbon Works, Jersey City, N. J.
Electric Dynamo Co., Bayonne, N. J.
Electrical Review, New York City.
Electrical World & Engineer, New York City.
Edison Electric Illuminating Co., Boston, Mass.
Eastern Electric Cable and Wire Co., Boston, Mass.
Elm City Engineering Co., New Haven, Conn.
Erickson Electric Equipment Co., Boston, Mass.
Forg, Peter, Somerville, Mass.
Felkin, A. Co. & M. L., Boston, Mass.
General Electric Co., Boston, Mass.
Gleason, John L., Jamaica Plain, Mass.
Gould Storage Battery Co., Boston, Mass.
Greenwood & Daggett Co., Boston, Mass.
Homes Mfg. Co., New York.
Harvey Hubbell, Bridgeport, Conn.
Hill, W. S., Electric Co., New Bedford, Mass.
Johnson & Morton, Utica, N. Y.
Johns, H. W. Manville Co., New York.
Knowles, C. S., Boston, Mass.
McKenney & Waterbury Co., Boston, Mass.
Mullen, Colman J., Brooklyn, N. Y.
Manhattan Electrical Supply Co., New York.
Minimax Co., Boston, Mass.

Marshall Electric Mfg. Co., Boston, Mass.
Miller Anchor Co., Norwalk, O.
National Carbon Co., Cleveland, O.
Ovington Mfg. Co., Boston, Mass.
Pass & Seymour, New York.
Pettingill Andrews Co., Boston, Mass.
Proctor-Raymond Mfg. Co., Detroit, Mich.
Poole, J. W., Columbia St., Boston, Mass.
Renim Specialty Co., Boston, Mass.
Ridgeway Dynamo and Engine Co., Boston, Mass.
Roebling, John A. Sons Co., New York.
Steel City Electric Co., Pittsburg, Pa.
Safety Armorite Co., New York.
Smith Premier Typewriter Co., Boston, Mass.
Sprague Electric Co., New York.
Swazey & Smith, Boston, Mass.
Stuart Howland Co., Boston, Mass.
Simplex Electric Co., Boston, Mass.
Starbuck Sprague, Boston, Mass.
Trumbull Electric Mfg. Co., Plainville, Conn.
Valentine Electric Sign Co., Atlantic City, N. J.
Westinghouse Electric Mfg. Co., Boston, Mass.
White, O. C., Co., Worcester, Mass.
Wireless Railway Co., Philadelphia, Pa.
Y. M. C. A., Boston, Mass.

THE ERECTION OF THE NEW AMSTERDAM THEATER, NEW YORK.

The New Amsterdam Theater, at 41st and 42d Streets, New York, is about 100 feet wide, 150 feet long and 140 feet in height above the curb, and contains about 1,360 tons of structural steel in the columns and girders of the theater proper and 350 tons in a 25x100- foot, 11-story office building connected with it. The theater part is a double-deck structure with a roof garden, stage, balcony and dressing rooms above the main auditorium, and the latter's complement of similar rooms. The dimensions of the auditoriums and stages are large, and the unobstructed areas are so great that the heights of the columns and the weights of the main girders are unusually large, and the steelwork presents some interesting features in the design and erection. The former was illustrated in The Engineering Record of November 19 and 26 and December 3, 1904.

The roof of the roof garden has long-span girders and trusses, which support only the ordinary roof load and a portion of the balcony. The heaviest construction is in the floor of the roof garden, where the 42-ton main transverse plate girder, about 83 feet long and 12 feet deep, spans the auditorium at a height of about 75 feet in the clear above the basement floor. This girder carries a large portion of the loads for the floor of the roof garden and the suspended ceiling and gallery of the main auditorium. It is seated on solid-web knee braces which give it additional connection to the main columns. It is made with web plates ¾ inch thick and 6x6x⅞-inch flange angles with both vertical and horizontal legs reinforced by heavy plates.

The columns which support the girder are of the Gray pattern, made with twelve 6x4 and 6x6-inch angles and a pair of 15-inch channels with reinforced webs, having a total cross-section of over 153 square inches for a maximum stress of 1,234,000 pounds direct compression. The column below the girder was shop-riveted in three lengths, the lowest one having a weight of about eight tons. All material was received on trucks and unloaded by a stiff-leg derrick, which delivered to a 20-ton guyed derrick situated near the center of the building and commanding the entire area. This derrick had a 65-foot mast and a 56-foot boom, which in handling the roof girders was lengthened 14 feet by splicing to it another boom. The two pieces of timber overlapped several feet and were packed with wooden fillers carefully concaved to fit both sides of the round timbers. Transverse steel pins through the adjacent ends of the timbers projected far enough on both sides to receive four turns of a 1-inch steel cable wound back and forth with the ends fastened together by means of ordinary clamps. These give a total of eight parts of rope acting directly in tension to transfer the load from the exten-

New Amsterdam Theater, New York, on which the "Boyer" Riveting Hammers were used.

sion to the main boom, besides which some frictional resistance was developed by wire rope lashing at both ends. With this splice the boom was considered good for a load of 14 tons at the extremity. The derricks were operated by Lidgerwood and Mundy hoisting engines which were at first located in the basement and afterward moved to the street. The derrick was secured by twelve steel rope guys set at such an angle that it was sometimes necessary to temporarily release one guy in order to pass the boom across it. Materials for the large plate girder were handled by a small traveling derrick at the level of the roof-garden floor and all the field rivets in it were driven by Boyer pneumatic hammers. Ten of these were installed and were operated by air from the 4-inch vertical standpipe near the center of the building, which was extended story by story as the different tiers were erected. All of the riveting was completed for each story before that on an upper one was commenced, so that only one outlet was used from the standpipe at any given time.

The next heaviest members were a pair of open-web girders in the roof. They were about 55 feet long, 10 feet deep and weighed 28,000 pounds each. They were shipped whole from the bridge shops and delivered to the building on a six-horse truck. The boom of the 20-ton derrick handled them at long radius, lifting them by a single hitch above the center of gravity. These trusses were flexible transversely and were temporarily stiffened against erection stresses by reinforcement timbers lashed to their top and bottom chords.

In order to handle the 10-ton trusses over the stage, the 65-foot boom of the stiff-leg derrick was reinforced by timbers bolted to the sides and by hog-chaining. The steelwork was erected by an average force of 150 men in 90 days.

J. H. Gray & Co. were the engineers for the structural work, which was fabricated in Belgium, except the large girders here described, which were made at the Trenton and Empire plants of the American Bridge Co. Herts & Tallant were the architects and the general contract was awarded to the George A. Fuller Co., who also erected the steelwork under the direction of Mr. Louis R. Barras, superintendent.

A MILLION VOLTS CURRENT

Passes Harmlessly Through the Body of Chester I. Campbell, Yet Melts Iron, Platinum and Even the Glass Insulators---Tesla's Spectacular Experiments to Be Outrivalled at the Electrical Exposition.

So absolute is the control of electricity attained by some of the master minds of to-day that apparently impossible happenings are of frequent occurrence. For instance, a current estimated to exceed a million volts is rendered harmless even when the full force passes entirely through the body, as was demonstrated in the recent case of Mr. Chester I. Campbell, manager of the electrical exposition to be held in Mechanic's Building July 15-22. Mr. Campbell declares that the sensation was almost imperceptible and that he felt absolutely no ill after-effects, although to the writer he admitted that he approached the ordeal with some hesitation.

One of the features of the exposition will be demonstrations of this and other high frequency phenomena by Mr. Earle L. Ovington, who has made a ten-years' study of high frequency currents and has designed an especially powerful apparatus for this exhibition. With this new apparatus he will repeat many of the spectacular experiments with which Tesla astonished the world, as well as perform a series of experiments never before attempted. One of the most startling of these is to pass enough current through his body to light the room in which the exhibition will be held. A small fraction of this immense power would be instantly fatal if in the form of electrical currents as ordinarily employed. This peculiar high frequency electricity, however, is vibrating at such an enormous rate that the human senses cannot perceive it, and it passes harmlessly through the body, even though the intensity of the currents may be over a million volts and the amperage ten times that now adopted at Sing Sing and other prisons for the purpose of electrocution.

A most spectacular demonstration is

called "The Fountain of Fire." In this experiment the apparatus is set in operation at its full power and an enormous quantity of energy is liberated into the surrounding ether. Purple, snake-like tongues of electrical flame leap outward and upward. Mr. Ovington approaches, holding in his hand a piece of iron or platinum wire, which melts in his fingers as the electricity, jumping into his body in the wierdest manner, passes through it and thence into the metal. He will also show the discharge passing through five inches of solid glass; also melting its way through glass and other insulators. Much of the success attained by Mr. Ovington is due to a novel form of interrupter, based on the principle of the new Hewitt mercury vapor lamp which is exciting so much interest.

While these spectacular demonstrations serve to illustrate the power and harmless quality of the currents, the great value of the apparatus is to the physician for the generation of X-rays, Finsen rays and the cure of disease. These peculiar currents seem also to possess vitalizing, as well as curative properties, and are attracting the earnest attention of medical men.

TOMMY'S DIAGNOSIS OF STEEL.

Teacher wanted I should write a composition 'bout steel. I asked her if she meant stealin'. She said, "No; just plain steel—no 'ing' to it." An' I "must be sure to spell it right." I've found it takes two ee's, an' not an a anywhere in it—the kind she means. I see lots of pieces in the papers 'bout it nowdays, too—both kinds; 'cause there is two kinds. One is when you get something that don't belong to you. The other belongs to you after you get it—if you don't steal it. An' before that it belongs to the man you get it of—if he didn't steal it. Hardware stores has it. They keep it 'cause it's hard and will wear, I s'pose. It's shiney—just like a lookin' glass, sometimes. Lots of things is made of steel. I didn't used to know much about it, but I've been findin' out. An' now, when anybody says "steal" I prick up my ears to see—I mean to hear—which kind they are talkin' about. Pa says I'd ought to be president of a steel trust. It's real interestin' findin' out things. I ask so many questions though Ma she gets mad, an' says if I don't quit stealin' she'll put me where there ain't no steel. Ma speaks in figures. She means to bed. I guess she forgot 'bout the steel springs.

When the new minister came this fall, they fixed his house all over. An' when the dressmaker came to our house the other day I heard her say to Ma, "It's a awful queer thing; an' I promised Miss Stone I wouldn't tell, 'cause she promised Mrs. Brown she wouldn't tell, but she told me they had to steal a cook-stove for the parsonage." "Had to steal a cook-stove?" said Ma. "Yes," said the dressmaker. "An' I think it's a downright shame." "So do I," said Ma. She told Pa 'bout it when he came home to supper. He said he hadn't heard nothin' 'bout the minister bein' arrested, nor nothin'. I seen Uncle Jim laughin' kinder sly, an' when he got a chance he spoke up and says, "I guess I can tell you what it all means." Then he said how the trustees had come in our hardware store an' bought a lovely range—a steel one—for the parsonage—that's the minister's house, to live in an' his family—I was glad Miss Fixem heard him 'splain it. 'cause now she'll set the whole village right, an' by to-morrow night everybody will calm down an' know that no harm hain't been done to nobody by nobody else, an' that me an' Uncle Jim keeps first class steel ranges for sale in our new hardware store. Uncle Jim was tickled, 'cause he b'lieves in advertising. So do I, even if a woman does boss the job.

You can make awful pretty things out of steel, if you know how an' have got time, an' the steel. Steel is a important part of the United States, 'cause if there wasn't none, folks would have to go somewhere else to buy them things. An' then what a lot of money we wouldn't get!

Once in a prayer meetin', old Mr. Simpson he commenced to begin a tune all by himself alone. He was goin' to sing, "I love to steal awhile away," but he didn't seem to get on the right note or somethin', 'cause he'd sing, "I love to steal"—an' then stop an' clear his throat, an' begin over again, "I love to steal——." Three times he done it, then the minister he said, "We all understand our good brother's weakness and are sorry for it. Some one help him, please." Pa says he's got brown kittys or somethin'.

Everything can be made out of steel now, 'cept firecrackers, an' stuff you eat. Uncle Jim says if folks only knew, it pays to have your things steel—not stole—'cause

they 'most always don't ever wear out. A man came in the store one day. I was alone. The man looked at some stoves, an' then he said to his wife—I s'pose she was—"Well, Nancy, I don't know how you feel about it, but as for me I'd rather buy iron than steel." "That's the true sperit, Samuel," says she. "Stick to it. Be a honest man an' I'll stand by you an' see you through."

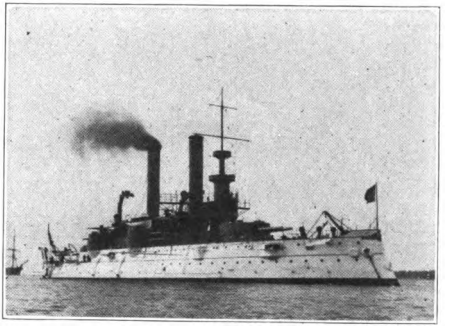
Say, do you know, steel is nothin' but iron fixed somehow with charcoal. I never done none. Don't know how. Glad I don't, 'cause then I'd probably have to fix all Uncle Jim wants in the store. If the family finds out I know how to do any odd jobs like that, I always have to do it an' keep on doin' it, whether I want to or not. So I don't want to know how to steel, or steal—either one. Steel is hard. The other kind you spell with an a is hard, too. It sends folks to jail. The kind me an' Uncle Jim has in our new hardware store is the cleanest, brightest, and usefullest kind there is. We don't neither of us never have nothin' to do with the other kind I spoke of—'less we're 'bliged to.—*H. F. Bell, in Metal Worker.*

II. PAPER—INDUSTRIAL EUROPE.

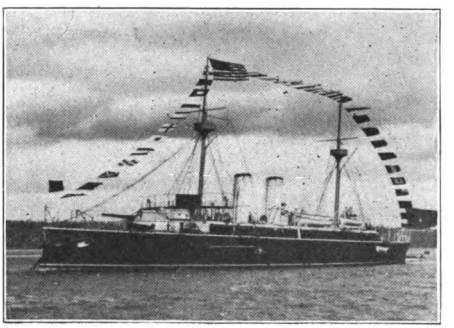
BY LIEUTENANT GODFREY L. CARDEN.
United States Revenue Cutter Service;
Late Superintendent Arsenal Tools,
Department of Machinery,
World's Fair, 1904.

On the third day of July, 1898, Europe awakened to a realizing sense that a strong naval power existed in the Western Hemisphere. A fleet had been destroyed with a loss to the victorious side of but one man. But what astonished commercial Europe more than any other feature and by commercial Europe is meant, in particular, the iron and steel and machinery and shipbuilding interests of the Continent, was the fact that when the crucial test of the battle came not a breakdown occurred on any of the vessels of the victorious fleet.

The ships of the United States before Santiago represented the very superlative of what the American workman is capable, and in the United States battleship Iowa is seen one of the strongest of Admiral Sampson's vessels. On that July morning in 1898, when the Iowa bore down on the enemy, firing every gun she could bring to bear, she resembled more than anything else a great thunder cloud rent by lightning; her firing side was one mass of flame, occasioned by the almost continuous discharge of her guns. In that action the Iowa fired more than 1,800 projectiles, the heaviest weighing 850 pounds.

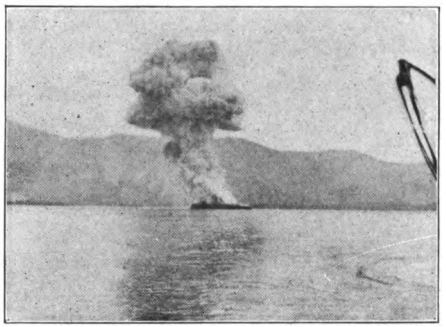


The leading ship in the Spanish fleet which emerged on July 3d from Santiago harbor was the Infanta Maria Theresa, as fine a vessel of her type as could be found in the world anywhere. She was built in a Spanish shipyard, but mainly under the superintendence of British superintendents. She was well armed and bravely manned, and yet inside of one hour and fifteen minutes after she cleared the harbor entrance she and the Oqwendo were on fire.

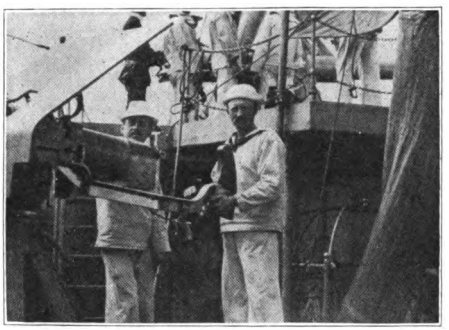


The second vessel in the Spanish squadron, the Viscaya, was a sister ship of the Infanta Maria Theresa, and like the latter was built in a Spanish shipyard, but largely under the superintendence of British superintendents. She, too, was well armed—was manned by a brave crew and was commanded by one of the ablest commanders in the Spanish service, and yet inside of one hour and thirty minutes after she

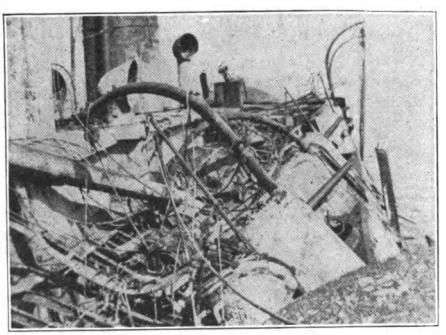
cleared the harbor entrance she also was in flames.



But while the heavy guns of the American ships were pounding to pieces the enemy's vessels, it was the fire from the light rapid-fire guns that was killing off the guns' crews. The shells from these



light rapid-fire pieces were bursting along the Spanish upper works like so many firecrackers. The Viscaya received probably the heaviest fire of any of the Spanish ships and it early became a case on board that craft of run for your life or die, and to the everlasting credit of the Spanish



gunners the majority of them chose to die. This accounts for the terrible loss of life on board that ship.

To appreciate the effect of shell-fire, look at the starboard side of the Viscaya as it appeared after the fight. Note how great angle-irons, frames and beams have been twisted and bent like twigs. To be sure the havoc has been heightened by the fall of the military mast athwart all, but the wonder is that anything living could exist on board of that ship, and yet men were taken off from the Viscaya, after the action, alive. Of all the men stationed above the water line of the Viscaya before the action commenced, not more than twenty, it is stated, escaped death or injury in some form.

The writer has made the foregoing references to the Santiago fight because of the very general interest he found among engineers in Europe to discuss the topic. Military Europe recognized the consummate skill displayed in the handling of the American ships, but it was commercial Europe, the heads of the iron and steel and machinery and ship-building plants that perceived the high grade of workmanship that necessarily existed in those ships.

One day in Berlin, the writer received an order which said in effect, "Get 40,000 horse power in Europe for the St. Louis World's Fair power plant. Go wherever you see fit, get the latest and the best, but don't pay a cent for it."

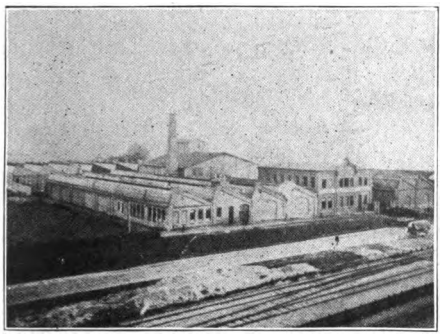
It was the most comprehensive order the writer had ever received.

In explanation, however, it should be said that authority was given to pay the cost of transportation, the cost of installation, the cost of maintenance, and the cost of insurance; but the underlying principle was that the topics offered for service (to do work) must always continue in the hands of the original builders throughout the exposition period.

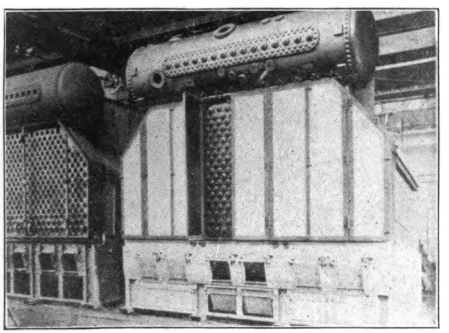
Leaving Berlin the night of the same day on which the instructions arrived, the writer early the following morning reached Dusseldorf on the Rhine, and there visited a suburb known as Ratingen, where the Durr boilers for the German navy are made.

The Ratingen shops are covered with

saw-toothed roofs, a form of construction almost universal throughout the Rheinische provinces. These saw-toothed roofs permit of the maximum amount of light being secured, and of course the idea is always to obtain northern light.

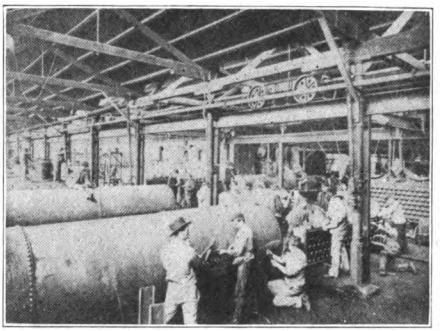


The writer can attest to a number of American shops which in design and construction are equal to the best in Germany, but generally speaking he found that the Germans in their late built plants have paid closer attention to sanitations and to permanent layout than we have. There is a branch of the Durr works located at Dusseldorf on the Rhine, and in both the Ratingen and Dusseldorf shops the writer found boilers under construction for ships of the German navy. As these Durr boilers represent the latest development in Germany in water-tube boilers for ships of large power, it was deemed especially desirable to secure a representation for St. Louis, and a Durr shipment did go forward inside of four weeks, and on arrival out it was labelled "The first foreign shipment to the World's Fair power plant."



On going through the Durr shops at Ratingen the writer had one of his first opportunities to observe shop-practice abroad in comparison with shop-practice at home. The Ratingen shops seemed fairly alive with men and the work was carried on for the most part by hand.

This working by hand was also true of the Dusseldorf shops, where men were seen chipping, rivetting and caulking by hand.

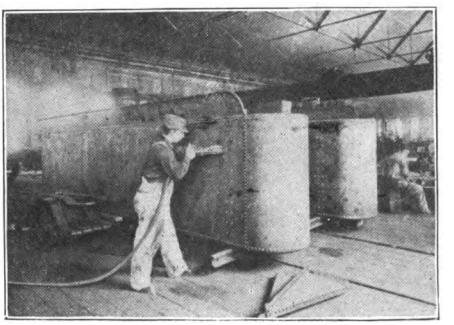


Now compare this working by hand with the methods in vogue in an American shop where pneumatic tools are employed.

Here we have the true notion of shop efficiency, for through the use of these pneumatic tools there is effected a great saving in time, some think a superiority in work, but surely a saving in expense.

A pneumatic tool has cut a chip nine feet long from a corrugated boiler-furnace in one hour and twenty minutes; and when it comes to rivetting one man performs the work which ordinarily devolves upon several, and the saving in time is enormous.

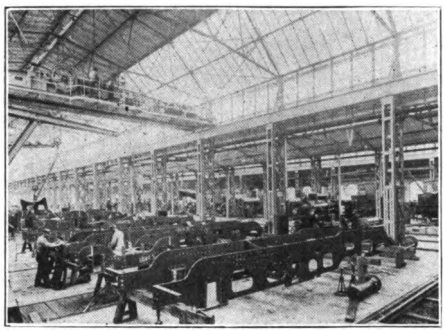
To-day, the Chicago Pneumatic Tool Company is shipping tools to do service



on the East Indian railways, where of all localities hand labor is the cheapest, and yet, it is found, the pneumatic tool can economize over this cheapest of hand worker—the East Indian laborer.

But it would be misleading, if attention was not called to some shops in Germany fitted with equipment fully up to American standards. There are many of these shops, but the best of the equipment generally has an American stamp.

Take the great Borsig Works, located at Tegel, just outside of Berlin, and go through the main locomotive shop. It is a magnificently lighted up structure—as light inside, almost, as out of doors.



Interior Borsig Locomotive Shop.

The house of A. Borsig is renowned for its locomotive construction work, and in April, 1902, the Borsigs celebrated the building of locomotive No. 5,000.

As the writer stood at the head of the Borsig locomotive shop, and watched the easy mannered, plodding way in which the workmen moved about, instinctively there came back to him the scenes at the great Baldwin works in Philadelphia where but a few weeks previously he had tried to count the number of men working on one engine. They were on top, on the sides, underneath, inside. It was impossible to count them, they were moving so rapidly, but he estimated that there were from twenty to twenty-five men engaged on one machine.

And yet this Borsig shop—this staid, plodding, matter-of-fact German plant—together with the Cassel, the Hanover, the Schwartzkopff and the Mulhouse shops, all German, have practically prevented our locomotive builders from getting any important orders outside of the Western Hemisphere in the past two years, with the exception of what we have sent to Japan. We lost to the Germans the recent big East Indian railway contract, and the British lost also, and we lost and the British lost because on a relative test of merit the German locomotives, it was so announced, were found more economical and better made.

In 1896 we exported to Russia alone, 74 locomotives; in 1897, 60 locomotives; in 1898, 44 locomotives; in 1899, 62 locomotives.

For the fiscal year ending June 30, 1900, we exported to European countries the following number of locomotives: Belgium, 23; Denmark, 1; France, 22; Germany, 4; Russia, 53; Spain, 2; Sweden and Norway, 6; United Kingdom, 84.

For the fiscal year ending June 30, 1901, the American Locomotive shipments to Europe were: Belgium, 6; France, 30; Germany, 2; Russia, 23; United Kingdom, 15.

For the fiscal year ending June 30, 1902, the American locomotive shipments to Europe had come down to: Belgium, 4; France, 1; Spain, 4.

For the fiscal year ending June 30, 1903, our previously splendid locomotive shipments to Europe had dwindled down to two (2) engines for Spain, and no more. And all this time we were plainly in the export business and not by any means too busy to take a foreign order. This is evident from the fact that we sent during the same year abroad, and not counting those engines sent to Mexico and Canada, locomotives as follows: Costa Rica, 1; Cuba, 11; Argentine, 1; Brazil, 8; Peru, 5; Venezuela, 1; Chinese Empire, 4; Korea, 32; Philippines, 1; British Africa, 10.

Studying official reports it would seem as if German exports in mobile engines, inclusive of locomotives, traction engines, steam rollers, steam traveling cranes and steam shovels on wheels, have on the whole increased year by year. In 1902 Germany exported to Russia in the above material, 3,575.1 metric tons; in 1903, 4,329.6 metric tons; in 1904, 4,345 metric tons.

The German exports to Italy, in the above material, for 1902, 1903 and 1904 were, respectively, 1,909.1 metric tons, 1,578.4 metric tons, 2,318.9 metric tons.

In 1902 Germany exported, in the above material, to Japan, 88.7 metric tons; in 1903, 89.1 metric tons, and in 1904, 1,569.8 metric tons.

The German increases in exports of the above sort cover, in addition to the foregoing countries, Bulgaria, Austro-Hungary, Portugal, Roumania, Sweden, Switzerland, Turkey, Egypt, German Southwest Africa, China, Argentine and Bolivia. There has been a falling off in Great Britain, Netherlands, Belgium, Siam, Brazil and in British North America, while Germany is apparently holding her own in Chili and in Spain.

It is noteworthy that where Germany has made her increases there is generally found a corresponding decrease in American goods.

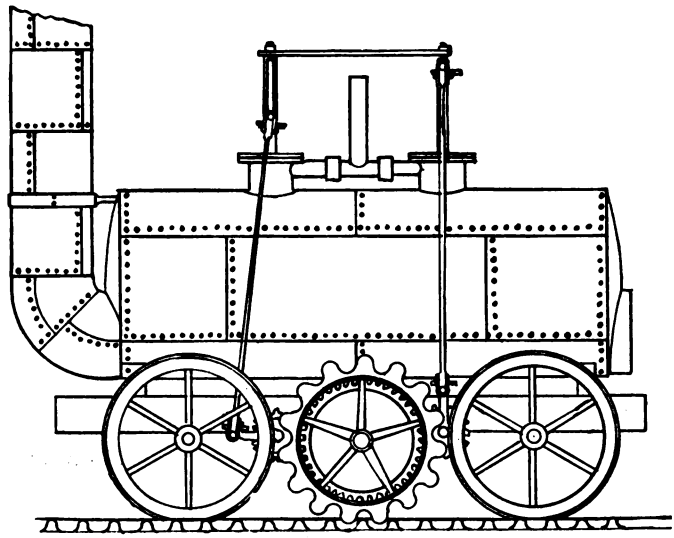
While it is seldom palatable to be told that one is being beaten, there is never so much danger in mere defeat, as there is blinding one's eyes to a true knowledge of the facts.

The locomotive situation may be summed up in a few words. The conditions at home and abroad are entirely different. We impose on our engines enormous loads. We contend with great extremes in heat and cold. We demand great boiler power. We insist first and all that the traffic should be moved, and we are willing to scrap-heap an engine inside of eighteen months if we think it has done its share of work. In Europe economy in fuel is everything. Coal is dear on the Continent, while in America we run our railway tracks, figuratively speaking, alongside of coal mines. Not only is economy demanded in Europe, but also longevity. In the latest engines on the Continent superheater attachments are common, and to secure longevity the greatest care is exercised in the building of a machine. Recently the Pennsylvania railroad purchased an engine from the Mulhouse works. The machine was turned out from the Belfort shops, and was received in this country in time to be exhibited at the World's Fair. It was later assigned to service, we are informed, on the Altoona division of the Pennsylvania road.

We can get the foreign trade. We can get all the trade we want when we go after it intelligently, but we must first of all give the foreigner what he wants, and that which he thinks he requires. Recently the American Car and Foundry Company took an order for some pressed steel cars for a road in Spain. The designs did not agree with American standards, nor would the Spanish engineers agree to a change. They insisted on steel angle-iron when iron was recommended. It was pointed out that by adopting the American plans the cars could be built cheaper and in quicker time; but no, the Spaniards insisted on a fulfillment of their own designs. The order was filled and at a rate of speed of fourteen cars in a period when sixty cars of the same tonnage might have been turned out. And what is the result? If one of these cars breaks down there will be no standard parts to draw on and a gang of men must be sent out to repair the car where it stands. But the American Car and Foundry Company took the order and executed it, and the chances are that the company will not only hold the business, but will in time bring the foreign buyer around to the American way of thinking, and will be able to deliver to him standard American equipment.

American locomotives exported beyond North America during the year 1904:

	No.	Value.
Europe—		
Spain	1	$2,693
South America—		
Argentina	19	137,506
Brazil	13	129,791
Chili	4	36,845
Colombia	5	47,251
Ecuador	1	6,935
Peru	16	199,577
Venezuela	1	5,850
Asia—		
Chinese Empire	6	39,750
Hong Kong	2	31,500
Japan	74	624,873
Korea	6	87,720
Oceanica—		
British Australasia	1	5,500
Africa—		
South Africa	2	9,110
Portuguese Africa	1	11,822



Murray's Locomotive upon Blenkinsop's Railway, 1812.

MURRAY'S LOCOMOTIVE UPON BLENKINSOPS RAILWAY--1812.

In 1811 a Mr. Blenkinsop of Leeds took out a patent for a machine and rail adapted to each other; a rack or toothed rail was to be laid down along one side of the track, into which a toothed wheel of his locomotive worked.

The boiler of his engine was supported by a carriage upon four wheels without teeth and resting immediately on the axles. These curved entirely independent of the working parts of the engine and merely supported its weight, the progress being affected by the motion of the cogged wheels working on the cogged rail.

This engine began running on the railroad from the Middleton collieries to the town of Leeds, about 3¼ miles, on the 12th of August, 1812.

For a number of years it was a permanent object of curiosity and was visited by crowds of strangers from all parts. These engines (for several were afterward constructed) drew after them 30 coal cars loaded, at a speed of 3¼ miles per hour, and were in use for many years and may justly be considered as the first instance of the employment of locomotive power for commercial purposes.

TREVITHICK'S LOCOMOTIVE 1803.

This engine was built by Richard Trevithick, a Cornish miner, in consequence of a wager of 1,000 guineas that he would convey a load of iron a distance of 9 miles into Merthyr, Tydvil, South Wales, upon a cast iron tramroad by the power of steam alone.

The engine was finished in 1804 and succeeded in accomplishing the feat of drawing after it several wagons containing 10 tons of bar iron at the rate of 5 miles an hour; but it was an ill constructed machine and having got out of order it was deserted by its builder.

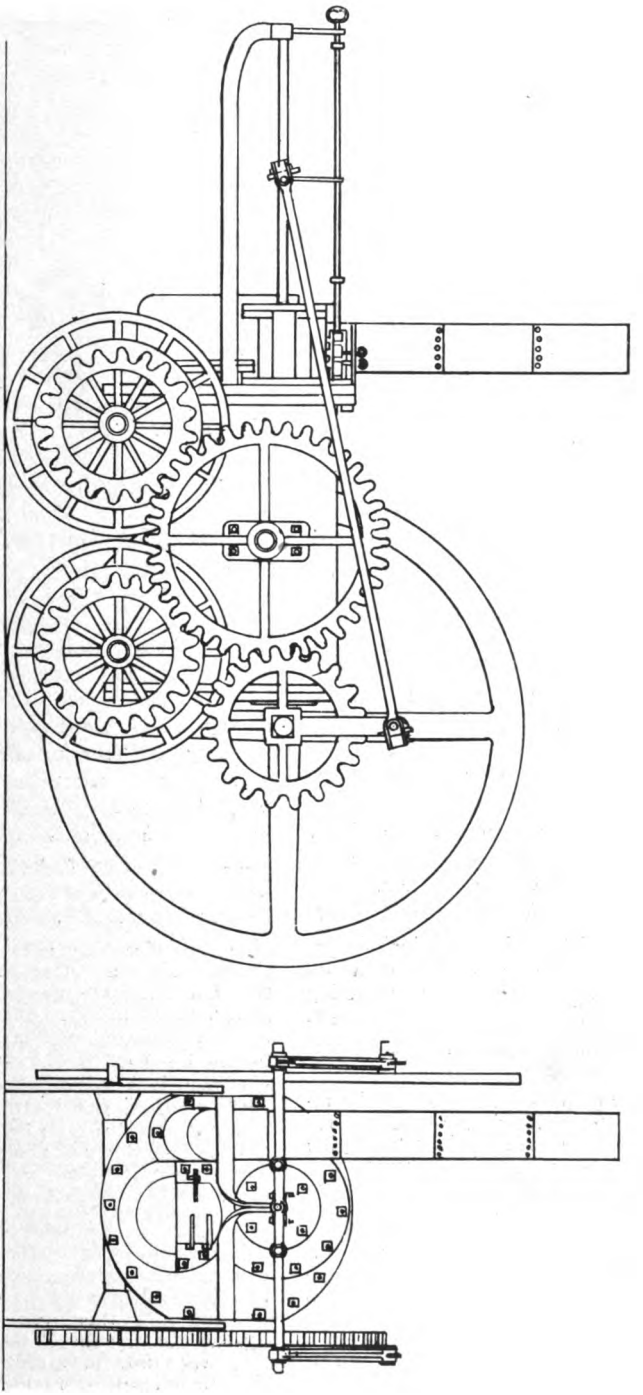
The boiler was cylindrical in form, flat at the ends, and made of cast iron; the furnace and flues were inside the boiler, in which a single cylinder of 8 inches diameter and 54-inch stroke was immersed.

In this engine was first employed the "force draught" created by the steam for working without a high stack, the exhaust steam being turned into the stack about a foot above its junction with the boiler.

In Woman's Lexicon.

"Mamma, what is a spinster?"

"A spinster, my dear, is a woman to be envied. But don't tell your father I said so."—Browning's Magazine.



Trevethick's Locomotive, 1803.

AN ELECTRICAL GIANT.

Mammoth Magnet Lifting Tons to Be Demonstrated at the Boston Exposition.

A giant magnet, lifting tons dead weight, will be one of the wonders to be seen this month in Mechanics' Building at the International Electrical Exposition. Instead of the cumbersome and laborious method of encircling heavy masses of metal with a chain sling, with the subsequent unclinging after the mass is in position, the touch of a button charges the magnet, allows the mass to be raised, swung into position or lowered, as the case may be, and then instantly released by shutting off the current. Engineering and building operations now progress more rapidly, with a great saving of labor as well as time, and the work of the huge cranes becomes almost entirely automatic and attains a speed of operation little short of marvelous. Chucks, clutches and grips of great variety, for a wide range of machine work, are also operated in the same manner. Another interesting and notable feature will be an elaborate X-ray exhibit, also a complete exhibit of medical and surgical electric apparatus.

Among the quarry machinery will be seen a model of the huge five-motor electric traveling crane which has recently displaced ten of the old steam power derricks in a Vermont marble quarry. It easily raises a block of marble weighing 50 tons to a height of 35 feet and traveling 800 feet. Electric drills, chisels, saws, buffers and channeling machines are also greatly reducing hand labor.

The traveling public will be greatly interested in a new electric annunciator, for special use at elevated stations, notifying passengers, in advance, of the route, destination and stops that the approaching car or train will make after leaving a station.

Then, too, will be the operation of the wonderful new wireless trolley, the invention of a young Philadelphia electrical engineer, which entirely does away with all overhead structures, as well as the dangerous "third rail."

Manager Campbell reports that space is being rapidly taken, and that the exposition will be the most elaborate and successful in the annals of electricity.

PNEUMATIC TOOLS.

The use of pneumatic riveting tools, against which shipyard and other workmen in this country have stubbornly arrayed themselves, bids fair at last to overcome all opposition. The handiness, efficiency and great labor-saving qualities of the tools of several makes—mostly American—now well known in this country, have been clearly recognized by employers; but economic and labor difficulties have barred the way to their general employment to a much greater degree than any disadvantage attaching to their use alleged by the conservatism and prejudice of workmen. Of these disadvantages much objection has been made to the vibration of the tools in working, and the consequent effect on the operator's nerves. Something, no doubt, was lacking in the earlier tools on this score, but vast improvements have recently been made, and there is now no reasonable ground for any objections to the use of pneumatic power hammers for riveting, and much less for chipping and caulking. The strike amongst dockyard hands a year ago, on the score of "harmfulness to the nervous system," was abortive as regards consigning the tools to the limbo of desuetude, while the recent strike on the part of the same class of workmen against the "injustice" of allowing apprentices and "mere laborers" to work the tools to the detriment of the interests of the "skilled" artisans, showed the real state of things. While this has been the condition of affairs in government dockyards, it will be understood that the objections to, and obstacles put in the way of the use of these labor-saving appliances in private mercantile yards and workshops have been more abundant and forcible. However, it would now seem that opposition has run its unenlightened and futile course. Some little time hence a conference of shipbuilding, boiler-making, bridge-building, and other employers is to be held in Edinburgh, the primary object of which is to arrange equitable scales of price rates for the due and general use of pneumatic riveting, drilling, and other tools to their fullest capacity, and by the classes of skilled artisans who now apparently recognize that their handicraft is in imminent danger of extinction, or of passing into alien hands. —The Times (London, Eng.).

Make the minutes pay.

Do the hard things first.

Aspiration + Perspiration = Success.

Do your procrastinating to-morrow; act to-day.

Your worth consists in what you are, not in what you have.

The world doesn't owe you a living. It was here first.

When a man begins to raise the devil, he always lowers himself.

There are two sides to every question—your side and the wrong side.

It is better to touch one chord than to pull many strings.

Petrified people, like petrified trees, take the finest polish.

You can easily classify your friends among the wills, won'ts and can'ts.

The man who can but doesn't, must give way to the man who can't but tries.

Unless a man has scored at least one failure, he is unable to appreciate success.

A man without ambition is a derelict, dangerous to others and of no value to himself.

When a man is resigned to his fate, the resignation is generally accepted.

Don't get discouraged—it's often the last key on the bunch that unlocks the door.

Just as one finds the key to the situation, the situation sometimes changes and it is impossible to find the keyhole.

Some men waste half their wind in doing a thing and the other half in blowing about it afterward.

Don't expect to find shade trees, easy chairs and rippling brooks in thick profusion along the road to success.

Cupid busies himself getting people into trouble, and then leaves them to fight their own battles.

Nine times out of ten, the fellow who is let in on the ground floor falls between the girders and lands in the cellar.

Like a beautiful flower, full of color but without perfume, are the fine but fruitless words of him who does not act accordingly.—Technical World.

A Doubtful Citizen.

"I've been thinking o' gittin' a marriage license," said the man to the Georgia ordinary, "ef you'll take a bushel of potatoes fer it; but 'pears like I'm sorter mixed up about it."

"How is that?"

"Well, I dunno what's best—whether to git married or eat the potatoes!"—Indianapolis Sentinel.

Bill had a billboard. Bill also had a board bill. The board bill bored Bill so that Bill sold the billboard to pay his board bill. So, after Bill sold his billboard to pay his board bill, the board bill no longer bored Bill.

"Girls with plump arms appear particularly attractive with short sleeves," says a fashion note. The same sort of girls don't look bad with short skirts.

A Washington youth wrote home after the elopement: "I am married now, and all my troubles are over." Married men, please don't titter.—Chicago Journal.

SEMI-ANNUAL REPORT

OF THE

President to the Share-Holders

OF

Chicago Pneumatic Tool Company

OF

NEW JERSEY

June 30th, 1905

STATEMENT OF PROFITS FOR THE HALF YEAR ENDING JUNE 30TH, 1905

Profits for the half year,		$ 413,941.54
LESS—Depreciation of Buildings, Plant and Machinery, including Repairs and Renewals of Buildings and Plant	$ 52,905.02	
LESS—Written off for experimenting and perfecting new lines of tools	4.800.00	57,705 02
		$ 356,236.52
LESS—Bond Interest for the half year,	$ 57,500.00	
LESS—Sinking Fund Reserve,	25.000.00	82,500.00
Profit available for Dividend,		$ 273,736.52
LESS—Quarterly Dividend No. 9 (1%),	$ 61,137.83	
Quarterly Dividend No. 10 (1%),	61.137.83	122,275 66
Balance carried to Surplus,		$ 151,460.86

SURPLUS ACCOUNT

Surplus brought from 1904	$ 254,030.82	
LESS—Appropriation on account of development work and written off,	28,593.51	$ 225,437.31
Surplus for the half year ending June 30th, 1905,		151 460.86
Surplus carried forward,		$ 376,898.17

August 4, 1905.

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